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MILITARY AND NAVAL PENSIONS OF THE UNITED STATES.*

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I. REVOLUTIONARY PENSIONS.

IN the fall of 1776, when Washington was sitting up night after night, depriving himself of essential sleep, to urge by repeated entreaties and arguments, that the Continental Congress furnish him an army, properly organized and reasonably equipped, one measure, then reluctantly granted, has become the corner-stone of the pension system of the United States. It was a Joint Resolution passed August 26th, which, it was hoped, would secure a fair pension to those soldiers who had been, or should be, disabled during the War of Independence.

Notwithstanding the danger, then much feared, of trenching upon the powers of the States, Congress granted direct *Military* and *Invalid* Pensions for about nine years; then, in 1785, the States consented and did pay the pensions on the recommendations of Congress, the Congress humbly confessing its inability to raise the necessary funds.

*Read before the Military Service Institution, November 23d, 1889.

This method was continued until September 29th, 1789. As soon as the new Constitution was launched and in vogue, the power of Congress to pay pensions to soldiers and sailors was unquestioned. We then find pensions established as such for life, and regularly paid by anuual appropriations.

All these pensions were confined to disability more or less pronounced; and they accrued by reason of service during the war, and were what the Pension Bureau now denominates *Invalid Pensions.*

An Act approved April 10th, 1806, limited the disability to "Known wounds received during the Revolutionary War," and extended its benefits to any one in any proper service against the common enemy.

It was not till March 18th, 1818, nearly thirty-five years after the Treaty of Paris, which closed the Revolution, that our Congress saw fit to grant *service pensions*, and even these were restricted to the indigent; there being monthly payments, for indigent officers $20.00 and enlisted men $8.00.

Under the Invalid Pension Laws (March 23d, 1792, February 28th, 1793, March 16th, 1802 and April 10th, 1806,) an officer received half his pay (but not above half a lieutenant-colonel's) for total disability and an enlisted man $5.00 per month. It is a notable fact that the children of Revolutionary soldiers never received a pension, but the widows did so for five years, or until remarried.

Under the Act of May 15th, 1828, all those who served to the end of the war, officers and enlisted men, then living, were pensioned on full pay (the highest not to exceed a captain's) and the indigent provision was omitted. These benefits were extended to *all survivors* by Act of June 7th, 1832.

As late as June, 1888, that is, 105 years after the war, there were 37 worthy widows who drew pensions. During that year there had been added three widows whose ages were respectively 84, 80 and 92. The last soldiers drawing pensions on the general roll had celebrated their own centennial. They were aged, at the time of death, respectively, 102 and 101 years. The former died May 3d, 1866 and the latter February 18th, 1867.

Two other veterans were added to the roll in 1867. They died, the one April 5th, 1869 and the other March 28th, 1869, aged, respectively, 109 and 105 years.

The whole number of officers and soldiers and their widows

who received the two sorts, to wit: *the Invalid* and *the Service pension* for the Revolutionary War, according to the roll of 1888, was 62,069. The amount of money paid is about $38,500,000.

Before closing this glimpse into the apparent liberality of our ancestors toward their soldiers, permit me an expressive extract from the first annual message of President John Quincy Adams, of date December 6th, 1825. He says:

"The Act of 18th of March, 1818, while it made provision for many meritorious and indigent citizens who had served in the War of Independence, opened a door to numerous abuses and impositions. To remedy this, the Act of 1st of May, 1820, exacted proofs of absolute indigence, which many really in want were unable, and all, susceptible of that delicacy which is allied to many virtues, must be deeply reluctant to give. The result has been, that some among the least deserving have been retained, and some in whom the requisites both of worth and want were combined, have been stricken from the list. As the numbers of these venerable relics of an age gone by diminish; as the decays of body, mind and estate, of those that survive must, in the common course of nature, increase; should not a more liberal portion of indulgence be dealt out to them?

"May not the want in most instances be inferred from the demand, when the service can be duly proved; and may not the last days of human infirmity be spared the mortification of purchasing a pittance of relief only by the exposure of its own necessities?

"I submit to Congress the expediency either of providing for individual cases of this description, by special enactment, or of revising the Act of the 1st of May, 1820, with a view to mitigate the rigor of its exclusions in favor of persons to whom charity, now bestowed, can scarcely discharge the debt of justice." It was subsequent to this message that the liberal legislation of 1828 was obtained. Surely the principles which President Adams so admirably set forth are of universal application. Now as then, the unworthy and fraudulent claimants cripple the just dues of the deserving.

II. PENSIONS OF THE WAR OF 1812.

When, after the sudden declaration of war and the breaking out of terrific hostilities on the Canadian border, it became necessary to raise additional military force, Congress passed and the

President approved, January 11th, 1812, the bill for ten new regiments of infantry, two of artillery and one of light dragoons.

In this Act itself we find a section which provided for individual pensions. It was substantially a re-enactment of a section of the law of April 10th, 1806, which with slight modifications had been repeated from, time to time, since 1790.

"Any officer or enlisted man disabled by wounds or otherwise while in the line of his duty in public service" was to be placed on the list of invalids and receive a pension, the highest rate never to be above half a lieutenant-colonel's pay. For an officer it was not to exceed half his monthly pay, the amount to be graded down according to the nature of the wound or disability; for an enlisted man the highest rate was $5.00 per month with a proportionate decrease for the lesser injuries. A larger liberality, however, was shown than toward our Revolutionary sires, in that in case of death in, or by reason of, service, not only was the widow provided for for five years, but where there was no widow (or she ceased to be a widow) the orphan child or children under 16 years of age had the designated allowance.

It is most probable that this more generous pension provision put into the very Act for raising troops was intended for the purpose of stimulating enlistments; for we know from history how unpopular at its outbreak that war of 1812–14 was.

Again in January, 1813, when 20 regiments more were added to the Army the same pension provision was inserted, besides some liberal grants to both officers and enlisted men; for example, refunding to officers extra expenses for attending courts-martial and for forage of horses; and to enlisted men, on discharge, travel pay and money value for rations.

At the close of the War of 1812, the Act of August 2, 1813, extended provisions similar to those enjoyed, under the general law, by the Regular Army, to volunteers and militia.

When the smoke of the conflict had somewhat passed away, with a view to getting better pensions for officers of low rank and for enlisted men, President Madison, in a special message to Congress, February 20th, 1815, ventured to say: "I recommend to your care and beneficence the gallant men whose achievements, in every department of the military service, on the land and on the water, have so essentially contributed to the honor of the American name and to the restoration of peace.

"The feelings of conscious patriotism and worth will animate

such men under every change of fortune and pursuit, but their country performs a duty to itself when it bestows those testimonials of approbation and applause which are at once the reward and the incentive to great actions."

But no extended or substantial legislation came from Mr. Madison's earnest and appreciative appeal, so, in a subsequent message, December 15th of the same year, he again pleaded as follows:

"As an improvement on our military establishment, it will deserve the consideration of Congress whether a *corps of invalids* might not be so organized and employed as at once to aid in the support of meritorious individuals excluded by age or infirmities from the existing establishment, and to preserve to the public the benefit of their stationary services and of their exemplary discipline."

The response to this is found in the Act of April 16th, 1816, extending the list of pensions and granting lands, and an Act approved April 24th, 1816, increasing pensions of enlisted men and officers of low rank. It gave a first lieutenant $17, a second lieutenant $15, a third lieutenant $14, an ensign $13, and an enlisted man $8 per month. These allowances were as usual for highest grade of disability—to be less for smaller hurts. These same provisions were intended to embrace the Navy, and were extended to the militia which had been in the United States Service.

By several Acts of Congress, the last in 1858, the limit of five years, though it had been often renewed, was removed from all pension of widows, and children under sixteen. The Commissioner of Loans in each State or district, or some other officer named by the Secretary of War, was for a long time the medium of reaching and enabling the pensioner to get his pay. In fact, until 1833, the War Department paid pensions that pertained to its soldiers, and the Navy Department to its sailors and marines.

The first *service pension* for survivors of the War of 1812 was granted by the Government in 1871, *fifty-seven years* after the war closed.

The provisions for this *service pension* of $8 per month from February 14th, 1871, embraced all survivors, officers and enlisted men, the Army and Navy included, who had had a service of sixty days, with some specific cases that had served less than

sixty days, and widows of soldiers in that war who had been married before the close of it. Proof of loyalty was required. The Act of March 8th, 1878, removed the conditions of date of marriage and of loyalty, reduced the necessary service to *fourteen days* or *service in a battle*. Widows' pensions under these acts were increased by Act of March 19th, 1886, to $12. The whole number of pension claims allowed for this war (1812) is reported to be 60,670, and the cost to June 30th, 1888, has been $36,310,256.04. The pensions of invalids and widows, and children of deceased officers and men granted under the general pension laws are not included in this sum, except where since 1871, the invalid pension has been consolidated with the service pension.

III. THE MEXICAN WAR PENSIONS.

The veterans of the Mexican War and their families have a similar pension history; *first*, the usual *invalid pension*, to the wounded and disabled, to the widows and to the children, substantially the half pay system, was kept up till *the service pension* was established January 29th, 1887, 39 years after the close of the war with Mexico.

The service pension, after deducting deaths, had increased the rolls of June 30th, 1889, by 17,065 survivors, and 6,206 widows, a total of 23,271. Hence the total Mexican war pension claims so far allowed have been 24,724, and it is estimated the total cost to the Government will be $13,000,000.

IV. THE REGULAR ARMY PENSIONS.

In the several wars the Regular Army has not been so separate in pension matters from the volunteers as to give it a separate and individual history.

There has been an occasional spasmodic increase and then a dropping back to normal numbers on a peace footing. The Army has always been more or less refreshed by numerous Indian conflicts on the frontier and a few metropolitan or village riots. The system of pensions, however, according to the statutes established for the regular force has been, till late years, the basis for the militia and volunteers, and the naval officers and men have been cared for on a corresponding apportionment; first, on the half pay system, never excluding that of lieutenant-colonel's pension, for total disability, and $5 per month for enlisted men.

Afterwards, for cases rated as total disability, there was an in-

crease to $30 for lieutenant-colonel and upwards, $25 for major, $20 for captain, $17 for first lieutenant, $15 for second lieutenant, $10 for cadet-midshipman, and certain warrant officers, and $8 for all other enlisted men.

In the Pension Reports we find grouped under the head of Army and Navy, not only the Regular Army and Navy pensions, but all pensions granted for disability or to widows and children (except the various service pensions), therefore, we must consider the Regular Army as being entitled to *invalid pensions* only, except for those Regular officers and men who took part in the two wars for which *service pensions* have already been granted. Among these pensions are placed the very large number granted by Acts allowing larger sums for specific disabilities in the War of the Rebellion, larger than is allowed by the general law for total disability; to these, all of the Regular Army, as well as the volunteers disabled in that war, are entitled.

RATES OF PENSIONS.

Turning to the Pension Report of 1888 we find a table, which covers a page with figures, with this heading: "Table VII. Statement showing the different monthly rates of pensions, and the number pensioned at each rate, of the Army and Navy invalids, and of the Army and Navy widows, minors and dependents (War of 1861) on the roll June 30th, 1888."

In that table 262 Army and 11 Navy invalids receive $1 per month, while 124 Army and 29 Navy receive $72 per month. Between these rates of $1 and $72 there are 122 grades of pay. The largest number of beneficiaries in any one grade is 69,210 at $4, the next largest 63,142 at $8. By special acts two invalids and three widows are pensioned at $100 per month; four widows, minors or dependents at $166.66 2–3 per month and three at $466.66 2–3.

V. THE PENSIONS FOR THE WAR OF THE REBELLION.

The Act of Congress, July 22d, 1861, which authorized the first 500,000 volunteers against the Rebellion, in its sixth section provided that any volunteer that might be wounded or disabled in service should have all the benefits conferred in the Regular Service, and that the widow or heirs, in the case of death, in addition to arrears of pay and allowances, should receive $100.

July 25th brought further authority for raising volunteers not

to exceed 500,000, to be placed upon the same footing in all respects with similar corps in the United States Army. Again, the Act of August 6th, 1861, legalized the acts, proclamations and orders of the President touching the Army, Navy, militia and volunteers which had been done or issued from March 4th, 1861, to that time. So that, even before special pension provisions, the great Army and Navy of 1861, so suddenly called into the field, was put, in respect to death, wounds or other invalidship, on the same general basis as the Regular Army.

But lest there should be any class of military or naval servants of the Republic excluded by the general law, the lengthy bill entitled "An Act to grant pensions," became a law July 14th, 1862.

This does not depart from the highest rates already given, but is quite specific; and an Act passed two days later lays down the assimilated rank of the Army and Navy, *e. g.*, rear admirals corresponding to major-generals, commodores corresponding to brigadier-generals, captains corresponding to colonels, etc., etc.

Since the enactment of this law, on account of the abundant legislation and the prevailing desire to meet cases of great hardship, the old system of rating the disability of enlisted men, disabled in the War of the Rebellion, has, of late years, been departed from. The gradual lifting up of the amounts allowed for the various specific disabilities has at last virtually overturned all the regular arrangement to which we have referred. To closely exhibit the present status of pension legislation I have copied a brief table of disabilities with their respective ratings.

Mr. Ohren, in *The Statesman* for July, remarks: "In 1865 a special rate of $20 a month for a permanent disability to perform any manual labor was created.

"In 1872, this rate was increased to $24, and 1883 to $30. By this last act the private was placed upon the same footing as the lieutenant colonel. * * * "

An officer or any member of his command is now entitled to $100 for the loss of both hands, and the same principle of equality distinguishes all the rates of $30 and upwards.

When the pension laws were consolidated in 1873, provision was made for an $18 rate for any disability less than that arising from the loss of a hand or foot, and under this rating most of the pensions have ranged from $1.00 to $18 per month.

In addition to the eight and eighteen dollar rates there are

three higher grades for non-specific disabilities. Third grade $24, second grade $30, first grade $50. The $24 rate which has been spoken of already is paid on account of those permanent disabilities, which medical experts consider are equivalent to a loss of a hand or foot.

TABLE FROM PAGE 195, *The Statesman.*

Disabilities.	From July 4, 1864.	From March 3, 1865.	From June 6, 1866.	From June 4, 1872.	From June 4, 1874.	From Feb. 28, 1877.	From June 17, 1878.	From March 3, 1879.	From March 3, 1883.	From March 3, 1885.	From Aug. 4, 1886.	From Aug. 27, 1888.	From Feb. 12, 1889.
Loss of both hands	$ 25.00			31.25	50.00		72.00						100
Loss of both feet	$ 20.00			31.25	50.00		72.02						
Loss of both eyes or the sight of both eyes	$ 25.00			31.25	50.00		72.00						
Loss of an eye, the sight of the other having been previously lost	$		25.00	31.25	50.00		72.00						
Loss of one hand and one foot	$	20.00		24.00		36.00							
Total disability in one hand and one foot	$		20.00	24.00		36.00							
Total disability of one arm or leg	$										36.00		
Loss of a hand or of a foot, or total disability therein	$		15.00	18.00					24.00		30.00		
Amputation of a limb at or above elbow or knee	$		15.00	18.00	24.00				30.00		36.00		
Amputation at hip joint	$		15.00	18.00	24.00			37.50			45.00		
Total disability in both hands	$		25.00	31.25	50.00		72.00						
Total deafness, both ears	$			13.00								30.00	
Amputation at shoulder joint	$									37.50	45.00		

The $30 rate is awarded for disabilities incapacitating veterans from the performance of any manual labor; and there is a sentiment in favor of the adoption of this rate as the basis for all ratings for non-specific disabilities.

To have a rate of $8 for *total disability* for the performance of manual labor, with the intermediate rates at $18 and $24, and another rate of $30 for a *total disability* from the performance of *any* manual labor, is a slight verbal distinction, with a $22 difference, that creates a good deal of confusion of thought in military circles on the subject of pensions.

The sum of $30 can be divided as readily as the sum of $8 or $18, and its adoption as a common standard would obviate the necessity of keeping constantly in view, subordinate standards of stiffened joints and amputated extremities. * * *

The $50 rate is paid in cases in which there is a permanent disabled condition requiring the regular aid and attendance of another person. But some soldiers so disabled are receiving $72 per month because Congress when it passed the Act creating this grade, ordained that all those pensioners receiving $50, June 16th, 1880, or had a claim pending at that date upon which they were entitled to $50 a month should received $72 a month; but that all persons who filed their claims subsequent to that date should receive but $50 a month. This is virtually a proclamation that those who from patriotism, perhaps, did not file their claims, until want compelled them to, are to be placed at a disadvantage, and paid $22 a month less for a given disability than those who were on hand bright and early June, 1880."

There are a good many of these inequalities in the pension laws, 3,370 bills have been enacted into law granting pensions to individuals that were not entitled to pensions under the general legislation, or, not to pensions of a satisfactory size.

From this casual glance, which could easily be carried to the cases of widows and other dependents, it is evident that great inequalities, and consequent injustice have grown out of attempts to remedy existing specific evils and individual misfortunes. There are great difficulties in the way, not only of the makers of the laws, but of those who are called upon to execute them.

The numbers of pensions, that had, up to June 30th, 1889, come upon the rolls of the Government from the Rebellion, including the small number occasioned by the service of the Regular Army and Navy, in peace, were, viz.: Invalids, 284,895, widows, minors and other dependents, 245,131, that is, a total of 630,026 beneficiaries; which have cost the Government over 1,000 million dollars.

THE PENSION MANAGEMENT.

The number of pensioners attributable to the Rebellion, remaining on the roll at the end of the last fiscal year was about 470,000. For a bird's-eye view of our present pension establishment, I quote a few items from the "Encyclopædia Britannica."

There is in the present Bureau of Pensions: "In all a force of 1,554 persons directly engaged in settlement of claims for pensions.

In addition to these there are at various points throughout the country 2,515 surgeons whose duty it is to examine all applicants for invalid pension who may be ordered before them, and report to the Commissioner of Pensions as to the degree of the applicant's disability. This makes over 4,000 persons under the management and direction of the Commissioner. In addition to this, there are 18 pension agents for the payment of pensions, conveniently located through the country. * * * The salaries and expenses of this large force for the fiscal year ending June 30th, 1888, amounted in the aggregate to $3,262,524.67.

"The total amount expended by the Bureau of Pensions during that year was $82,038,386.59, being 21½ per cent. of the Government's (estimated) gross income, $380,000,000; and 31 per cent. of the entire expenditures, $267,924,801.13, of the United States for the same period. * * * During the same fiscal year $1,439,530.10 were paid as fees to attorneys alone."

The aggregate amount paid on account of pensions from 1791 to June 30, 1889, has been $1,134,933,755.63.

DISCUSSION AND REMARKS.

Having now presented a meagre historic sketch of this subject for the four wars, we may add that various Acts of Congress have established the same provisions in connection with our Indian conflicts.

Now, with a view to discuss some important questions let us premise by a recapitulation of the classes entitled to pensions.

1. *Invalid pensioners*, viz.: Officers of the Regular Army, volunteers and militia; officers of the Navy, including the Marine Corps; and those enlisted in the military and naval force who have been rendered invalid by wounds or injuries received, or by disease contracted on duty.

2. *Widows.* The widows or children, under 16, of officers and enlisted men who have died from wounds received, or disease contracted while on duty. (The widow of a deceased soldier prior to 1861 was not entitled to a pension except when the cause of death originated in some war—correspondingly in the Navy; she received no pension unless her husband's death occurred in service.)

3. *Dependents.* Dependent mother, father or minor, brothers or sisters of those who died from wounds or disease having left no

widow or minor children. (These must have been more or less dependent at the time of the beneficiary's death.)

4. *Service pensioners.* These include all the above classes entitled under the several Acts of Congress to pensions less than *the service pension;* and also other survivors for their services in the Revolutionary War, the War of 1812, and the Mexican War.

I remark, *first:* Consonant with the foregoing review, my previous conviction has been strengthened, that it has been the intention of our legislators and our Presidents, who express the will of the nation, without regard to party divisions, to deal as liberally as practicable with the nation's defenders; and further, I cannot detect any desire or settled purpose on the part of the administrators of the Government's bequests to defraud, or treat with injustice, those whom the law proclaims as beneficiaries. It should be remembered how the various soldiers' homes are provided and filled: how wholesome are the retired lists of the Army and Navy; how soldiers have been favored in the matter of employment; how bounties have been paid; how thousands of homesteads have been secured by them, by the law shortening the requisite number of years to complete the title; and how generously, in most of the States, soldiers have been placed in positions of public trust and responsibility. The vast majority have a livelihood, are proud of their service, and are happy.

Second. As to *the irregularities* and *injustices* which exist in the superabundant legislation on this subject, some of the causes have been hinted at. They should be and can be fully remedied. For example: Suppose a special commission be appointed of seven members or more, composed of the wisest and best men of great legal and judicial experience, with instructions to revise and codify all pension legislation and all pension regulations thereunder. Also enable said commission to draw such appropriate bills and such appropriate regulations as would embody the evident intention of the nation, and submit the same for re-review and action by Congress and the Executive. Every good soldier would rejoice at such considerate, complete, and thorough action. This statesmanlike work, could, probably, be effected without party division.

Third. As to a general service pension I do not yet advise it; first, because the claims of the invalids and their dependents must first be attended to. The requisite sum for a *general service pension, i. e.*, a pension for everybody, would be so great that

it would necessarily create public discontent and take from those who were good soldiers something of the warmth of affection and heroic sentiment which they have excited, and still excite, among the people at large. I believe that a Post of the Grand Army of the Republic, in New York City, embodied the common sentiment of living soldiers when it declared, that as much real patriotism may be displayed by refraining in time of peace from inflicting unnecessary burdens on the country as by coming to her defense in time of war; and that any soldier, who applies for, or accepts a pension that he does not justly deserve for disability incurred, or receive as a reward of service when he is too old to labor, is guilty of conduct likely to injure the men who were and are willing, without any reward beyond the approval of their own consciences and that honorable fame which is dear to every patriot, to give their blood and their lives for their country.

I said I do not yet advise the service pension. After thirty-five years, as in the Revolutionary War, that is, in the year 1900, the conditions of survivors may admit, or call for, the service pension; but the fifty-seven years from the War of 1812, which elapsed before the survivors of that war received the service pension, affords a better example. Perhaps fifty years from the close of the War for the Union, that is, in the year 1915, the nation could celebrate a jubilee, and bestow upon every survivor of the great army, which redeemed it, a reasonable and honorable pension.

Fourth. Frauds in connection with a national gratuity, as in securing the bestowal of personal benevolence, unfortunately, will be attempted.

General Andrew Jackson said concerning them in a message to Congress in 1834: "Circumstances have been recently developed showing the existence of extensive frauds under the various laws granting pensions and gratuities for Revolutionary services. * * * I therefore recommend * * * that an actual inspection should be made in each State into the circumstances and claims of every person now drawing a pension. The honest veteran has nothing to fear from such scrutiny, while the fraudulent claimant will be detected, and the public treasury relieved to an amount, I have reason to believe, far greater than has heretofore been suspected." President Jackson made a further suggestion that all payments should be suspended till the necessary reports were received. Of course, the chances for attempting

fraud, as human nature has not much changed since the days of Andrew Jackson, are a hundred-fold greater with the enormous pension list of to-day. Claim agents, even when thoroughly honest, have, nevertheless, enormous interests at stake. When their offices and hall-ways are filled with unsettled claims from floor to ceiling, temptations are great to use every effort to secure re-rating, higher and higher, and most speedy action. Business enterprise in this age of tremendous vigor urges the employment of every unforbidden means; and who can say where enterprise ends, and avarice begins. For one, it would please me if every beneficiary could secure his pension without the intervention or the fee of the claim agent.

Fifth. Perhaps the complaints which are most numerous and best founded come from the delays in the granting of claims which are most worthy and undisputed. Speaking of the year 1888, a newspaper says, that of the 35,089 cases allowed *28,282* had been held in the office for *two years* or longer; 18,353 *five years* or more; 10,262 *nine years* or more! The report for the same year shows that there were under examination 414,448 unadjudicated cases; a year before that there were 374,354; two years before there were 306,971, and three years before there were 280,666, such cases showing an unhappy accumulation from year to year, which indicates either that the force in the department has been too small or that the methods of organization and work were radically wrong.

Sometimes in a Government bureau of ancient lineage and long aristocratic standing there has crept in what statesmen call "circumlocution." Often the same paper, that a single official should dispose of, passed, in this system of circumlocution, through the hands of eight or ten manipulators, and so a day was wasted with little accomplishment. Whether this, or anything like it, is still true of our pension department, the waiting soldiers do not know; but the accomplished men who are now responsible have doubtless ascertained or can ascertain; and, I doubt not, have sufficient courage to stand to their convictions, and obtain from their employés most thorough and effective work.

Some of the cases of waiting we know are very sad; but the organizations of the veterans of the war endeavor to take care that no comrade shall be left utterly without help in the midst of his misfortune; and the families of the deceased, through them and the different Women's Relief Corps, are not neglected.

So, with a sanguine feeling, I am confident that all old soldiers

and their friends, having stated their case, can trust Congress, and its executive branch—the Pension Bureau—to take proper and thorough measures to remedy this evil of delay, and other evils of administration necessarily incident to so large an establishment.

The pension laws themselves, we need to emphasize it, require complete and careful revision; and at the same time they should be so simplified that an expert be not required to understand and interpret them to a claimant; nor an attorney to plead for him with the bureau for the highest of several rates possible under different interpretations of the law.

Agreeing fully with all who are interested in pensions to exclude with care those who willfully deserted the Service or shirked their duty by any sort of contrivance, I have in this paper relied upon our comrades, as in the war, for the highest motives of patriotism.

No soldiers in any country have been more highly commended for their spirit of self-sacrifice and supreme devotion. Let no subsequent wrangling, self-seeking, or anything, akin to begging, be ever allowed to soil the soldier's pure escutcheon.

Believing such to be the general feeling among the survivors of our last war, I am confident of the happy settlement of every vexed problem that now disturbs or concerns us.

(For Discussion on this Paper, see "Comment and Criticism.")

THE DANGER TO THE COUNTRY FROM THE LACK OF PREPARATION FOR WAR.

By BREVET MAJOR-GENERAL JOHN GIBBON,

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IT is proposed to treat the subject under several heads.

1st. What are the dangers?

2d. Can they be averted?

3d. What would be the probable results—immediate and ultimate—if any of these dangers are not in time provided against?

THE GREATEST DANGER.

I. The greatest danger is the one which is the most apparent: that danger which every one called upon to meet a novel contingency for which he is unprepared, incurs: the danger which faces the sailor when his ship with all sail set is struck by a sudden storm: that danger to which every banker or business man is subjected, if, when a financial crisis comes, he has not foreseen and prepared for it. A ship captain who, for fear of a storm, is always furling sails will not make much progress in his voyage. A banker or business man who, in constant dread of a financial crisis, is deterred from entering into sound and feasible business relations, will be outstripped by his neighbors in profitable investments.

LOOKING AHEAD.

Hence, whilst it is not well to be an alarmist—constantly predicting disaster—it is well to look ahead as far as possible, and make suitable provision for a contingency which most thinking men regard as probable.

LARGE STANDING ARMIES.

It is a very old maxim that in time of peace we should prepare for war, but republican governments are proverbially mistrustful of large standing armies, and they have good reason to be. For when large masses of men are withdrawn from the *producing*

classes and are organized into a *consuming* class, they soon become separated from the mass of their countrymen by occupation, interest and sentiment, and are but too apt, in time, to become the willing tools of those on whom they are dependent for their pay, their subsistence and the existence of their organization. Where old, long established, monarchical governments stand close alongside of each other, as in Europe, the whim of a crowned head, the ambition of a prince, or a petty squabble, is often sufficient to induce two armies to hurl themselves against each other in a struggle to test their relative prowess, or the comparative strength of their rulers. Hence the apparent necessity in those countries, for each government to keep up immense standing armies ready at any moment to meet the contingency of war in resisting encroachments, or protecting the weak from the assaults of the strong lest these should become stronger, and destroy "the balance of power." In these struggles the welfare of the people, as a whole, is generally lost sight of. Were it out of the power of any of these nations to go to war with another without the consent of the people, there would no longer be the same necessity for such immense armaments.

In this country, where so much of the continent belongs to one nation with no powerful rival in close contact with it, the need for a large standing army is not felt; nor are there apt to arise those thousand and one pretexts for hostilities which exist with nations less favorably situated. In addition to this is the fact that by our fundamental law the Executive has not the power to declare war; for although this provision does not actually *prohibit* war, it is a great check upon the actual declaration of it.

SUDDEN WAR.

The danger in our case will be enhanced by the *sudden* arising of a necessity for war. Wisdom has warned us against entangling alliances with other nations, liable to result in our being compelled to adopt their quarrels and being forced into war as a consequence of them. It being the fixed and true policy of this country not to maintain large armies in time of peace, the serious question which presents itself, is, What are we to do in the accidental emergency of war?

WAR DURING AN ELECTION.

Before, however, considering this question it might be well to look at another danger which would, very materially, increase the

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peril of our suddenly becoming involved in war. Of this greater danger recent occurrences have a tendency to remind us all. Should war come on on the eve of, or in the midst of a presidential election, the danger to us and our institutions would be tremendously increased. To be threatened by an invading force at a time when the whole country was torn up with a heated political campaign, in which the very question of peace or war might still farther inflame partisan passions, would add very much to the difficulties of preparing to resist a foreign foe. Our dangers, too, would be very much enhanced were it to happen that a presidential election should occur in the midst of war. Perhaps these are dangers which are inseparable from our system of government and hence cannot be averted; although the possibility of such dangers might suggest what has sometimes been urged, on other grounds,—the lengthening of the presidential term—with the hope that this might lessen the chances of the dangers here referred to. The possession, by a foreign foe, of the city of New York during an election would have a good deal more effect in changing the complexion of the electoral college than bushels of Murchison or Morey letters.

WHAT WOULD BE DONE?

Without indulging in too much fancy it might be beneficial to speculate in regard to what would probably be done in case this country was suddenly involved in war. From this speculation it may be possible to draw inferences from what we *would* do as to what we *ought* to do beforehand, so far as can with propriety be done.

TIME NEEDED.

The most important element for us would be *time*. Time to prepare for the death struggle with a powerful adversary. For in a great country like this with free institutions, and more than eight millions of free-men available for military duty we would all look forward to a most desperate struggle sooner or later. Time would be required to organize and provide for the large armies on which the ultimate result would probably depend. For these operations the more time we can have the better. Just at this time, with a good *pre-arranged* system, we could, with the large number of veteran soldiers left by the late war, organize and equip, in a comparatively short time, a very considerable body of tolerably efficient troops—troops which would be very formid-

able in resisting the invasion of a hostile force. The first and most important matter then will be to provide for lengthening as much as possible the *time* needed for bringing into existence our armies and providing for them. This at once brings to the front the necessity of an efficient and formidable naval force; for our first line of defense is our extensive sea-board. Our only means now for defending our sea-ports are our naval vessels and our torpedo system, for our land defenses, proper, are worthless. Were war proclaimed to-day against us, a strong naval force would probably be at once sent against one or more of our principal sea-ports, with a view of getting possession of them for use as starting points and depots for armies of invasion. Our sea-coast is so extensive that it would be a very easy matter for a hostile force to land and effect a footing at one of a hundred different points, but the possession of a good harbor would facilitate matters very considerably and its capture be well worth the risk of a speedy expedition. To resist this, all our available naval vessels should be at once concentrated at the principal harbors, to resist the entrance of the enemy's ships, and an efficient system of land torpedoes prepared for each. There is no denying the fact that to-day our navy is in no condition to make much of a stand against such a force as could be sent against us by several of the great powers of the world; but, thanks to the impetus given to naval affairs in the last few years, this defect is being rapidly overcome and it is hoped in a few years more we shall have a very respectable and formidable array of naval vessels. In the meantime the less formidable our naval force the greater need to supplant it, for each harbor, with a well-equipped torpedo system. Large appropriations should be made for torpedoes, and a supply of them kept on hand convenient to every large sea-port on the coast. The artillery troops on the sea-board should be well instructed in their use and in the method of placing and exploding them. In every harbor plans should be drawn up giving the position and power of every torpedo to be placed, so that they could be properly and efficiently planted at short notice, ready to use the moment a hostile vessel entered the harbor. This information should be kept in a secret book under lock and key and be accessible only to the commanding officer and confidential staff officers. With these precautions the danger of a *coup-de-main* from a hostile fleet would be very considerably lessened and possibly obviated, thus gaining us the much

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needed time for perfecting our defenses still farther and organizing our armies; besides compelling the enemy to land his invading forces at places of secondary importance, from which their movements would necessarily be so much slower, as to still farther increase our *time*.

THE NAVY AND TORPEDOES.

The efficient means, therefore, of averting the dangers of a sudden war are a formidable navy and a perfected torpedo system for each harbor.

As has already been stated, our present land defenses are practically worthless. There is not a fort in the country which could withstand for any length of time the fire of the heavy guns of an iron-clad fleet and, what is worse, the inside of these forts would be more dangerous for the defenders than the outside. This state of things might be remedied to a certain extent, at some points, and thus relieve the Navy of a portion of its herculean task in defending our harbors. For this purpose we should "fight the Devil with fire" by establishing, in favorable positions on shore, the same kind of turrets and heavy guns which have proved so formidable afloat. Earth-works and masonry walls are soon knocked to pieces by modern artillery, but iron turrets (revolving by means of concealed machinery), and nature's hills will sustain an indefinite amount of the hardest pounding.

Revolving turrets armed with guns of the heaviest calibre should be placed at suitable points near the entrance of harbors. The machinery to work them can be better protected than it is on board ships. With high ground behind, a perfectly protected tunnel will give access to the machinery and guns to the working force from the army which lies in a comparatively safe position on the high ground beyond, on some such plan as is roughly sketched above. One such turret at the Narrows in New York Harbor, supplemented with a few good torpedoes, would do more for the protection of the city of New York than all the tiers of guns provided for at that point. Experimental turrets should be provided as soon as possible and in a few cases placed in position and tested. The form and dimensions of the model turret being once established and its efficiency demonstrated, others could be manufactured, placed in position and supplied with guns from time to time as our necessities required. The

engineer department should select *now* the positions where, in an emergency, such structures should be placed.

ORGANIZING ARMIES.

Having provided for keeping the enemy at a distance as long as possible, we must now look to what is necessary to be done in the way of providing means of effectually resisting the invading forces, which, if the war is to be a serious one and the conflict not confined exclusively to naval forces, must come sooner or later.

This brings us to the more purely military part of the subject, and the question must be met, practically, whether war actually comes to us or is only seriously threatened. For a threatened war would set the whole country on fire, and in the tumult of excitement we should all be at sea unless some system had been devised beforehand for *mobilizing* our fighting forces.

Thanks to our extensive system of railroads, traversing all parts of the country, our large manufactories of every kind, and our stupendous agricultural products, the question confronting us is not as formidable as it otherwise would be. These three elements of strength preclude the idea that *any* force from abroad—even the largest that the available transportation of the world could bring—could ever succeed in obtaining possession of or permanently hold any considerable portion of our widely extended country.

Our little army of 25,000 regular troops has often been termed a *skeleton*, and such it is. Let us see if by any device we can fill out this skeleton, furnish it with flesh, blood and muscle and make of it a good, hard-fighting body of adequate strength.

A great deal of the success of any plan to attain these objects will depend upon whether or not the war in which we engage is a popular one, and sometimes, even in the most popular wars, the demands of patriotism are not met as fully as they should be. To be obliged in the midst of a great war to resort to either heavy bounties or a draft would be both risky and unfortunate.

MEN AVAILABLE FOR WAR.

A country, in case of need, is entitled to the services of every able bodied man within certain limits.

Men available for military duty should be classified and made

amenable to service. By section 1625, R. S., it is provided that every such man between eighteen and forty-five shall be enrolled in the militia. It is thought that eighteen is too young an age to be established by general law. The age of twenty-one is preferable, and is advantageous in this that it is the legalized coming of age and the age at which men are qualified to vote. Hence the registry list for elections would furnish an excellent basis for the classification. On the first of January of each year, every man who has become of age since the preceding January should be placed on the list of "availables" for that year and designated "class of 189–," etc. In a few years every man available for military duty would know his class and, in case of war, when he would be called on to join the ranks. So long as the ranks were kept full by volunteering there would be no need to call men from the yearly "classes."

Without some arrangement of this kind, made *beforehand*, the country would be very much at the mercy of an invading army. In case of need such portions of these classes as were required could be rapidly assembled at designated railroad centres. The last census shows that more than half a million of men become of age yearly. Of course many of these would be exempt from military duty on account of physical disabilities. Within a specified time after the first of January (say three months) the case of every man to be so exempted should be examined and passed upon by medical boards. In this way the status of every man in the yearly class will be established beforehand, and with the exception of the comparatively few, who may become physically disqualified afterwards, the actual number to be depended upon in case of war will be known. From these yearly classes a specified percentage should be designated for active military duty when required, and individuals could be designated by lot.

Here is the material, how can we best make use of it?

FUGLEMEN.

In drilling regiments it is a very common practice to make use of "fuglemen." These are well-trained and drilled men who are placed well to the front where their trained movements in going through the manual of arms can be perceived, rather than seen, by every man in the ranks. These instinctively conform their movements to those of the fuglemen, and thus attain proficiency and uniformity in drill.

It is a well-known fact with military men that new recruits thrown into intimate relations with old soldiers, even in an active campaign, become rapidly affiliated with the veterans, and soon become efficient soldiers.

The Regular Army, then, should be used as "fuglemen" for the more numerous new forces. How best to do this, and obtain the best results, is a question which can be fully answered only by experience.

Hence only general plans will be outlined, with the hope that some of the suggestions may serve as starting points for future operations.

A regular regiment should be sent into a specified district composed of one or more States, its whole organization, officers and men to be used in organizing, drilling and equipping the militia forces. One company of regulars in a regiment of militia would be of immense advantage to the whole organization, not only as a standard and example to the inexperienced soldiery, but in the more active task of practical drill and discipline. This will interfere in no way with the constitutional provision for the appointment of the officers by the respective States.

In this way a single regiment of infantry, of ten companies, could be made use of to rapidly organize, discipline and drill, five or ten militia regiments according as one or two companies were assigned as "fuglemen" to each regiment, and ten such regiments would prepare for field service 100 regiments of militia, or 25 brigades of four regiments each. Artillery and cavalry regiments, having 12 companies each would furnish a larger number. If the whole of all arms of Service were to be used in this way, the result would be 430 regiments of militia, or 107½ brigades of four regiments, or a little less than 36 divisions of three brigades each. The companies of the Battalion of Engineers could, at the same time, be used in organizing and instructing engineer troops.

When this organization is completed and the forces divided into brigades and divisions, the regular troops, under such of their officers as had not been absorbed with the militia, should be consolidated into brigades and used in the more extended instruction of field operations.

In inaugurating this plan for organizing a force to take the field, the regiments of militia, already existing as drilled and disciplined bodies, would be of vast importance as a nucleus around which to form other regiments. If these were not at once filled up

to the standard by volunteers, then, and only then, should the classified men be resorted to to fill up the ranks.

Congress might establish the order in which the yearly classes should be drawn on, or the matter might be left to the Executive. It is thought the best order would be to call on the last class first, and exhaust that class in any particular State before the next class is drawn upon. A substantial bounty should be provided for in advance for all *volunteers*, so as to have as large a number as possible enter the service voluntarily, and all the pensions of the future, as well as all other government benefits, should be confined to those who volunteer, except in the one case of disability resulting from wounds received in battle.

WARLIKE SUPPLIES.

Whilst the "mobilization" is going forward and the Navy and torpedo system are engaged in keeping the enemy from gaining a foot-hold on our coast, every arsenal and factory in the land would be engaged in turning out warlike material, such as guns, rifles, ammunition, tents, harness, wagons, and equipments of all kinds, whilst horses and mules, hard bread and bacon and other articles already on the market would be purchased. Depots for all these should be established at certain transportation centres not too near the frontiers. To these the stores should be forwarded as soon as completed, to be received at the depots and systematically stored ready for issue by staff officers of the supply departments, and it is safe to say that by the time the troops were ready for them, the supplies would be on hand, ready for issue.

DEPOTS OF SUPPLIES.

These depots of supplies should be of a two-fold character: depots for the equipment and provisioning of the forces first needed for active operations, and those larger, more important and more retired ones, intended to equip and supply a *reserve* force; for the proposed system necessarily requires the organization of a strong reserve to be used, like a reserve on the field of battle, at the critical moment, to replace a disabled army and check the triumphant advance of a victorious enemy.

IMMEDIATE AND ULTIMATE EFFECTS.

Under the last of the three heads into which the subject has been divided, there is but little to be said. Whether preparations

were made beforehand or not, the *immediate* results, in all human probability, would be of the most trying and humiliating character to the nation; for organization, discipline, drill, and military efficiency *must* always prevail against a force without these essential requisites, no matter how courageous the individual members of it may be. Tried by the stern requirements of war, a free, independent and brave people will not require a *very* great length of time to rally from disaster and recognize the imperative necessity of supplementing individual bravery with those elements of military efficiency which all history and every military man of experience recognize as so essential to military success. Hence the greater need to make, beforehand, such preparations as *can* be made; for the greater the preparation made the less trying and humiliating will be our first defeats. In the consideration of this point it must be remembered our enemy, whoever he is, is going, if possible, to so time his blow as to strike us in our most vulnerable point—the weakest joint in our armor. Our unprepared condition, our institutions and the time of our periodical elections are known to all the world, and should hostilities commence on the eve of a presidential election, whilst it was going on, or during the four months' period between the election and the inauguration of a new administration, the first blows, in the absence of any preparation, might be so powerful as to practically place the country at the feet of a powerful antagonist, and render it a serious question as to which was best, to yield to his immediate demands, or run the risk of increasing them by our struggles to recuperate.

It may be safely asserted that *now* every American would declare that there could be *no choice* between two such alternatives, and that the whole country with one voice would pronounce for war to the knife. But it is easy to make good shots when "the other fellow" has no pistol in his hand. War is a stern master, and unanimity of sentiment is not to be anticipated under the circumstances supposed.

Hence, again, *some* preparation *must* be made if we hope to escape dire humiliation and trials.

With some feasible preparations, the nation does not exist which could practically *conquer* this country, united as we now are by common institutions and common interests extending over the greater part of a vast continent.

It shall be my endeavor to demonstrate that such feasible

preparations can be made without endangering our free institutions, or shocking the sensibilities of any portion of our people.

CONSTITUTIONAL PROVISIONS.

The constitutional provisions on the subject are ample. *Congress* alone has power to declare war, and no appropriation for raising and supporting armies can be for a greater period than two years. In its hands rests the power to make rules for the government of the land and naval forces, to provide for calling out the militia, and for its organization, arming and disciplining and for governing it after it is called out. And it has also the power to make all laws necessary and proper for carrying into execution the powers given it, and the powers given the government by the Constitution.

In accordance with the power given it, Congress has already provided by law that every able-bodied male citizen between the ages of eighteen and forty-five, with certain specified exceptions, *shall be enrolled in the militia.* (Section 1625.) There are other laws on the subject which might with great propriety be amended or abolished, and some which might with great benefit be added. The section relating to the kind of arms and equipment (Section 1628) ought to be dropped out, or, if retained at all, the modern arms and equipments of the country should be substituted for the shot-pouches, powder-horns, *twenty-four* cartridges, "hangers" and "spontoons" therein enumerated. The arrangements provided for in sections 1630–31 and 32, so far as dividing the militia into brigades and divisions, and the appointment of a large number of general officers, might well be abrogated, and there does not appear to be any necessity of providing an organization for the militia, when called into actual service, different (sections 1645–46 and 7) from what it was before. The organization, equipment and pay should be the same as for similar troops in the Regular Army and in a single section can be comprised the provision for classifying the men available for military duty, as suggested in the first part of this paper, and for calling them into the Service, when occasion requires, to fill the ranks of existing organizations in accordance with the plan therein laid down.

Any plan for the organization of our forces should be preeminently a *practical* one, and I believe the main features of the one here proposed can be demonstrated to be practicable without

any new legislation and by simply exercising the power now existing in the War Department.

Already officers of the Regular Army have been detailed to inspect and report upon the militia organizations in several of the States. Judging from the results, the services of these officers are not only very acceptable to the State authorities, but are highly appreciated by the State militia.

Taking advantage of the proximity of U. S. garrisons, let a company or several companies be ordered each year into camp with the different encampments of the State militia with instructions to report for duty to the commanding officers of the militia camps to aid in organizing, drilling and disciplining the militia organizations. Care being used in selecting crack companies with competent officers, the results of such a step cannot fail to be beneficial, will demonstrate the practicability of the scheme proposed and will aid very materially in devising the details of the plan for the future. In this way the plan can be inaugurated gradually and in time be perfected.

Such details would be eagerly sought for by the most competent officers and be enjoyed by both them and their men. In many things the regular companies would be suitable examples for the militiamen to follow and, from personal observation, I am satisfied the regulars would find it profitable to observe closely and imitate some things they would see in the militia. The expense attending this plan in a few cases would be very slight. If found to work it could be gradually extended until every State in the Union could have the benefits of the presence of at least a company of regulars in its militia encampments each year, and we will then have made very considerable advancements in the direction of an organized, disciplined force which could be called into actual service on short notice.

When this plan is perfected, every regiment in the Regular Army will have "a local habitation and a name," and when the time came each would know exactly where it was to go, what it had to do and with whom it had to do it.

The best time to inaugurate this plan is *now*. The remarkably creditable display made by the militia force concentrated in New York during the recent centennial celebration, demonstrates what can be done in the face of great drawbacks, and gives promise of the most satisfactory results following a more general and systematic organization.

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To those disposed to protest against making preparations to meet a highly improbable contingency, it might be said the contingency is *not* highly improbable, nor indeed *as* improbable as have appeared any of our wars just before they broke out. To any one who does not persistently shut his eyes to the facts, the loss of life, the human suffering, and the enormous waste of money and property consequent upon a lack of preparation, are evident to even the most short sighted. We may well reflect that without converting the whole nation into a military camp we may properly give heed to the warning of wisdom which counsels us "To prepare for War, in time of Peace."

MACKENZIE'S LAST FIGHT WITH THE CHEYENNES: A WINTER CAMPAIGN IN WYOMING AND MONTANA.

By CAPTAIN JOHN G. BOURKE, U. S. A.,

Third Cavalry.

IT may be a matter of interest to many readers to learn something of one of the most decisive encounters with bold and daring savages in which the soldiers of the Regular Army have ever been engaged; one in which the fierce, brave Cheyennes were humbled and their power shattered.

To avoid prolixity, and at the same time to present all that may be essential to a clear understanding of the situation, it is proper to say that in the war which began in the winter of 1876 between the United States Government on the one hand and the two tribes claiming an interest in the possession of the Black Hills of Dakota, on the other, the Cheyennes had been the more determined, more fierce and more resolute, although the Sioux furnished by far the stronger contingent, numerically considered, of the forces arrayed in hostility.

The operations begun in February, 1876, by the attack made by General Crook's forces upon the village of the Sioux chief, "Crazy Horse," on Powder River, Montana, and maintained throughout the ensuing summer and fall, by various large commands under Crook, Terry, Gibbon, Miles and others, had not been specially fruitful in satisfactory results. To be candid, in not a few points of view, the hostile Indians had had much the best of the argument. Custer's command had been destroyed, or paralyzed, and the engagements of the Lower Powder, Tongue, Rosebud, Little Big Horn, Goose Creek, and Slim Buttes, had at first view not been decisive. But a second examination would discover that the lines of destiny were drawing tightly about the doomed aborigines. Their supply of ammunition, formerly almost limitless, was now absolutely cut off. Their friends and supporters on the Reservation were cowed into good

behavior by the presence of large bodies of troops at the Agencies, by whom discipline was enforced of a stern, but just and salutary nature. "Red Cloud" and "Red Leaf," prominent Sioux chiefs, who, during the summer, had made no concealment of sympathy with their brethren on the war-path with "Crazy Horse" and "Sitting Bull," had been surrounded at the early dawn of a frosty October morning, all in their camps made prisoners, and every pony belonging to them seized and driven away.

Baffled and humiliated, they sulked in impotent rage, while the element in the tribe antagonistic to them gathered round the astute "Spotted Tail," listened to the counsels of General Crook and promised obedience and assistance to the Government whose rations they were eating. They kept their promises to the fullest extent. Hundreds of young warriors enlisted as scouts, and when in the latter part of October, 1876, the different portions of our command were ordered to rendezvous at Fort Fetterman, Wyoming, every Indian on the Reservation, or on the war-path, and every officer and soldier knew that the end was nigh.

From the official description of Fort Fetterman the reader can see that, in the days of which I am writing, it was situated in latitude 42° 49′ 8″ North, longitude 105° 27′ 3″ West from Greenwich, on the south side of the North Platte River at its junction with La Prêle (or Rush) creek. It was first established in July, 1867. The nearest stations on the Union Pacific Railway (Medicine Bow and Rock Creek), were eighty miles distant to the south, but as this "short" road was blocked with snow for nearly half the year, travel in the winter months followed the longer road to Cheyenne, 160 miles to the south-east, via Fort Laramie.

It contained quarters for three hundred enlisted men, and the necessary officers; the various magazines and store-houses required for the preservation of ammunition, rations and other supplies; a hospital with fifteen beds; stables for fifty horses; a corral capable of holding fifty six-mule wagons, with their animals; a theatre, an ice-house, a root-house, a granary, a bake-house, blacksmith shops, saw-mill, saddlers' shop, paint shop, laundresses' quarters and a steam engine for pumping water from the North Platte River.

Any ordinary map will show at a glance exactly where Fort Fetterman was, the different roads by which the columns con-

verged to that point, and the important part a military post played on the frontier.

The buildings had no pretensions to architectural elegance, being a single story each, of adobe, fronted by a veranda, but they served their purpose, were kept in good repair, were neatly painted and acted in a mild kind of a way as a Mecca for the first glimpse of which many a weary eye had strained its glance across the interminable plains between the Laramie and the Big Horn.

The expedition was composed of eleven companies of cavalry, from the 2d, 3d, 4th and 5th regiments, under command of General Ranald S. Mackenzie; four companies of the 4th Artillery, dismounted, and eleven companies of infantry, from the 4th, 9th, 14th and 25th regiments, under Colonel R. I. Dodge: the whole under the personal orders and supervision of Major-General George Crook.

Mackenzie, to whom the cavalry arm of the expedition had been assigned, was looked upon by the whole army as the embodiment of courage, skill and dash in an eminent degree. Impetuous, headstrong, perhaps a trifle rash, he formed a curious contrast to his self-poised, cool, silent commander whom the Indians of the plains and mountains from the British line to Mexico had learned to know and respect as the "Gray Fox."

Of the subordinate commanders and other officers, I cannot speak in detail; mention will be made of many in the appropriate places, but special reference in an article of this size and scope is impossible.

There was one comrade (much against his inclination, an absentee), of whom we often spoke kind words; Thaddeus H. Stanton, Colonel in the Pay Department, who had during previous campaigns handled the half-breed and full-blood auxiliaries, with courage, intelligence and skill. He never knew what it was to growl, never lost his temper, was at all times good-humored and helpful, full of story and reminiscence, a capital soldier, one of the best fellows in the Service, more like one of Charles O'Malley's dragoon companions than any one I've ever met, but extremely modest in referring to his own hard service, which he seemed to think was a matter of course. I should like to mention, were it possible, the good qualities of every soldier: Words of praise from me to individuals, however, would scarcely be possible, but I can surely be permitted to laud them in the aggre-

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gate and say in words something like those of Tiny Tim: "God bless them, every one."

The total effective strength of the expedition was, in round numbers, fifteen hundred officers and men, including a medical staff of six surgeons. This was of white troops only; but our Indian auxiliaries, in whose praise too much cannot be said, aggregated not quite four hundred more, divided among Sioux, Arapahoes, Shoshonees, Bannocks, Pawnees, and, most important of all, a few friendly Cheyennes. The Crows in the Judith Basin, in northern Montana, sent word that two hundred of their best warriors would start under Major Randall, to combine with the expedition at or near Pumpkin Buttes, or old Fort Reno; "Spotted Tail" expressed his willingness to allow as many more of his young men to enlist, if required, and the Winnebagoes, friendly for many years, applied through their agent for permission to send a company to take part in the campaign.

The military plans may be outlined in one paragraph. With the Indian scouts scouring the country in front, flank and rear, no trouble was to be expected in locating the villages of the hostiles; then the cavalry under Mackenzie could be pushed forward to strike a sharp, decisive blow upon anything not beyond its ability to handle, or, failing in this, could fall back upon the infantry following more slowly in its trail. To supply a column of this size, in the depth of winter, was a problem demanding most careful consideration. There was a train of one hundred and sixty-eight wagons and seven ambulances, with two hundred and nineteen drivers and attendants; and a pack-train of four hundred mules cared for by sixty-five expert packers, to follow after the cavalry whenever it should cut loose from the main body.

No finer, cleaner-cut expedition was ever known in the annals of the Regular Army. A large percentage of the rank and file had been taught the stern lessons of Indian warfare in the movements of the two years preceding and could take care of themselves under any and all circumstances. Every man was provided with a fur cap, fur gloves, fur leggings and felt boots, or else the ordinary cavalry boot with Arctic "snow excluders." Three blankets were allowed each soldier, besides an overcoat and tentage (so long as with the wagon train).

Company K, 2d Cavalry, under the gallant "Teddy Egan," (long since dead) was detailed as Provost Guard at headquarters,

to supply mounted couriers and mail carriers when needed, attendants upon the "travois" carrying the wounded, and other valuable duties of a kindred type.

The Indian scouts were divided into detachments of suitable size, dependent upon tribal relations, commanded by Lieutenants William P. Clark, 2d Cavalry, W. S. Schuyler, 5th Cavalry, Hayden Delaney, 9th Infantry, and Major Frank North, the last named so well known from his years of association with the Pawnees.

The Indian scouts were a superb lot of men, physically and mentally. Those who impressed me most were "Sharp Nose," chief of the Arapahoes, "Li-heris-oo-li-shar," or "Leading Chief," of the Pawnees, "Tupsi-paw" ("The Rag-picker") of the Shoshonees, and "Three Bears" of the Sioux; but in my long list of names, I discern those of such doughty warriors as "Pretty Voiced Bull," "Yellow Shirt," "Singing Bear," "Lone Feather," "Tall Wild Cat," "Black Mouse," "Charging Bear," "Feathers on the Head," "Fast Thunder," "Keeps the Battle," "Kills in the Winter," "Lone Dog," "No Neck," "Rocky Bear," "Six Feathers," "Sorrel Horse," "Horse Comes Last," "White Elk," "Bad Moccasin," "Fox Belly," and "Red Leaf."

Association with their white comrades soon begot a friendly intimacy under whose tender impulses names were exchanged, as in the case of Lieut. Charles Rockwell and others. Rockwell was our Commissary and a brighter or more efficient one never was known. The Indians saw plainly that a man who had absolute control over such immense quantities of bacon and sugar and coffee must rank very close up to the Great Father himself, so they made the friendliest overtures, offering to exchange not names alone, but clothes as well. Rockwell accepted the agnomen of "Six Feathers," but drew the line at the clothing business.

Only those who have known by actual experience, can appreciate the responsibility and labor entailed by the hurried organization of such an expedition, at any time and in any place, but more particularly when the time is an Arctic winter, and the place Fort Fetterman, Wyoming.

From the first sound of reveille in the morning until long after taps had hushed the worn-out troopers to rest, there was hurrying and scurrying worse than had ever been seen on Canoby Lea; all was movement, animation and activity. Heavily-laden

wagons rumbled along the roadway or gathered in canvas-covered column, to discharge cargo or to reload at the Commissary; here and there stood the caparisoned horses of officers and orderlies, showing the location of the offices in which business was transacted. Sentinels paced with monotonous cadence their weary posts of duty; a battery of cannon, covered but not concealed by paulins, and the evening parade of the companies with their well-dressed alignment of disciplined stolidity were suggestions of military precision in high relief from the hurly-burly and apparent disorder surrounding them. Groups of blanketed, painted, savage allies gazed impassively on the treeless, ice-locked channel of the Platte.

Far away to the distant horizon, the white-mantled terraces, extended in ridge upon ridge until they touched the hems of the leaden robes of cloud the sky had just doffed. Flocculent masses of vapor, like Golden Fleeces in an ethereal Pactolus;—brilliant carmine and bronze patches straggling across the dome, catching the last reflections of the sun going down behind the Western mesas; amber tinted zones, interspersed with steely-blue stripes resting upon the receding strata of snow-clouds;—were negligently mingled in a combination of rare beauty, in whose contemplation the weariness of official routine was almost forgotten.

The sharp boom of the evening gun signalled the descent of the sun; slowly the golden tints of the clouds changed to bronze, to carmine, to a dull red; this last turned into a pale yellow blending imperceptibly into the darkness of night, relieved by myriads of sparkling stars.

The atmosphere in its purity gave free passage to every beam of light, or re-echoed the slighest sounds. Only the crunching of feet trampling the crisp, crystalline snow, or the barking of some shadow-scared hound, relieved the stillness. It was Night in Wyoming and Winter had begun.

At last all was ready: the last ration had been packed away, the last cartridge issued and stored in belt, the last mule shod. The last official communication had been written; the last report exacted by red tape had been consigned to the post-office for transmittal to the mausoleum in the pigeon-holes of the War Department. The last requisition had been signed, countersigned, or returned to be properly briefed. For the last time, weary and eyesore aides-de-camp had had the honor to acknowl-

edge receipt of correspondence from Colonel A. and Major B. and Captain C., and to assure those estimable gentlemen that they were their very obedient servants; and for the last time the combined and pent-up ill-humor of the whole military estab lishment had burst with cyclonic wrath upon the devoted head of Major Furey, our efficient and amiable, that is usually amiable, quartermaster. He had been hauled over the coals by the general commanding, growled at by the battalion commanders, sneered at by the captains and damned by the lieutenants until patience had ceased to be a virtue and poor Furey assured me (during a lull in the storm of objurgation about midnight, while I was mixing him a little paregoric and hot water, or something like that,—my notes are a trifle blurred at this point and I can't clearly make out what it was,) that if he ever lived through the campaign he intended to resign from the Service and set up in business as a pirate, anything, rather than be a quartermaster another day. However, he seems to have reconsidered this determination, for his name is still borne on the Register.

There were councils and councils, never-ending councils with the Indians, but even these too, had an end, and on the 14th of November, 1876, the old familiar road to Fort Reno stretched out in a long, snaky line over the low bluffs to the Northwest, as the column began picking its way through the floating ice across the North Platte.

The scene was certainly most picturesque and full of animation; everything moved like clock-work. Each man, horse, wagon and mule was in proper place and the crossing was effected without difficulty, the volume of water at that season being scant and the current sluggish, a pleasant variation from the turbid, swift-rolling torrent which had carried away the ferry-boat when the transfer was in progress the last spring and hurried several teamsters with their horses to graves beneath its waves.

From the North Platte crossing to the then remote outpost of Cantonment Reno on the Powder River at the foot of the Big Horn range, is not much over ninety miles and was made by easy marches in four days.

Of the intervening country, not a great deal can be said; it is "high-rolling mesa," fairly well grassed, with some cottonwood growing along the courses of the insignificant streams, which are not worth the trouble of a description. The water is frequently vile and is never good until you get up to the Piney, one of the

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forks of the Tongue, just beyond Reno, where trout may be found in considerable numbers and of good size.

Buffalo had formerly roamed over it, but in 1876, had retired over towards the Rosebud, a considerable distance to the West. Antelope were still to be found in great herds, and my note-books recall to my recollection a very grand picture of a party of Indian scouts chasing a band of these fleet-footed coursers of the desert and shooting them down on the dead run.

So far the campaign had been without incident. There was nothing to talk about while marching and, even had there been, conversation would have flagged because your old soldier is a taciturn, grumpy animal on the march, not much given to an expression of opinion on any topic.

My personal inclinations led me to associate as much as possible with our savage scouts, whose modes of life, language and religious thought were always of an indescribable interest. Nearly all the talk I had with anybody was with them and the result was the enrichment of note-books with references to aboriginal customs in war and peace which probably could not have been obtained under circumstances of greater advantage. The American Indian is by nature so secretive and reticent that unless one by long personal association learns how to watch and extract information, much of what may be called his inner life, would inevitably be lost.

These Indian scouts covered the country for thirty to forty miles on each side of the column, letting nothing escape their scrutiny, but keeping their own movements well concealed. A party of them came upon three horse tracks shortly after we had left Sage Creek and followed them for a day, overtaking the riders, who proved to be white men, but whether pony thieves or "prospectors" they could not determine.

Part of the time we marched in the teeth of a biting storm of snow, and at every hour of the day the sun could be discerned sulking behind soft grey mists in company with rivals, known in the language of the plains as "Sun-dogs," whose parahelic splendors warned the traveller of the approach of the ever-to-be-dreaded "blizzard."

Cantonment Reno was not at that time suggestive of luxury or comfort: officers and men were living in holes excavated in the faces of clay-banks, or in make-shift quarters of similar type. It had been re-established for the protection of supplies to be issued

to expeditions like our own, and answered its purpose well enough. The officers and soldiers of the garrison were taking things philosophically and there was no growling or complaint of any kind. Still, an order to report for duty at West Point, or New York, Fort Monroe or Washington would, I fancy, have been received with gladness and obeyed with alacrity by most of them.

More unaffected hospitality couldn't be found anywhere in the world. It's a very strange phenomenon in human nature that a lieutenant who has only two blankets, and neither of them any too good, will become fighting mad and want to shoot the visitor to his post who will not accept the use of one; but let the same fellow marry a rich girl and go to live in a "cottage" in Newport, with seventeen spare rooms to it, and his own brother may make himself as comfortable as he can in the gutter. It may be the fault of human nature, or it may be the fault of the girl; perhaps, of both, but it's a queer thing, anyway, and I, for one, can't understand it.

I anticipated a trifle when I spoke of the Shoshonee Indians being with the column, which they did not join until it reached Reno, where they were awaiting it, over one hundred strong, under command of Tom Cosgrove, an old acquaintance and an old frontiersman, and the sons of their head chief "Washakie."

We remained at Reno only long enough to let the blizzard expend its fury; the days were not wasted, however. The commanding general (Crook) assembled all his Indians and laid down to them, in a few well-chosen words, rules for their guidance during the campaign. He emphasized the fact that all these vast plains, all these mountains and valleys would soon be filled with a pushing, hard-working population, the game would be exterminated, domestic cattle would take its place, and the Indian must make up his mind, and make it up now, to live like the white man and at peace with him, or be wiped off the face of the earth. Peace, the white man wanted. War he was prepared for. He wanted to impress upon his hearers the great fact that law was not tyranny; people who obeyed the laws were those who had the largest amount of liberty. It was not the white man, but the Indian who was afraid when he went to sleep at night that he and all his family might be murdered before morning by some prowling enemy. They were going to get good pay as soldiers, and so long as they behaved themselves, and so long as he could

find work for them to do, they should be soldiers, but they must not spend their pay foolishly. Save every cent of it and buy cows and mares. While the Indian was sleeping the calves and colts would be growing and some day he'd wake up and find himself a very rich man and then he'd be ashamed to call upon the Great Father for help. At this talk he saw before him representatives of the Kiowas, Blackfeet, Nez Percés, Cheyennes, Sioux, Arapahoes, Pawnees, Utes, Shoshonees, and Bannocks. What he said applied to them all. This was a good time to bury the hatchet and reconcile petty differences. Indians should be friendly to each other as well as the white man. One word more. When they came upon a village of the hostile Indians they must be careful not to kill women or children, as he was determined to make an example of any one caught disobeying this order.

The Indians listened attentively, and as sentence by sentence these remarks were translated by the interpreters or expressed in the sign-language, a chorus of Ughs! and grunts of approval passed from the inner circles to the outer. The greater portion of the Indians appeared in their new uniforms, yet a few sported magnificent war-bonnets of feather-work and other regalia. Responsive remarks were made by "Tup-si-paw" and "O-ho-a-tay" for the Bannocks and Shoshonees, "Sharp Nose" for the Arapahoes, "Three Bears" for the Sioux, and "Li-heris-oo-li-shar" and "U-sanky-su-cola" for the Pawnees.

"Li-heris-oo-li-shar" ("Leading Chief"), of the Pawnees, was determined to make the most of the occasion and impress upon the other Indians that he was nothing more or less than a white man, determined to "follow the white man's road."

The hand was the hand of Esau, but the voice was the voice of Jacob; his clothes were all right, a suit of Chatham Street "hand-me-downs" obtained from the munificence of the Interior Department during a visit to Washington; his face-painting, however, would not be justified by any of the canons of good taste inculcated by Ruskin or Whistler. Eye-lids and ears, and the median line of forehead and chin, blushed with vermilion; the cheek-bones were stained a dark brown, and the lower half of the face a dirty lemon. The hair was divided into two pig-tails, wrapped in yellow tape and hanging over the ears.

That night (November 19, 1876,) a degraded wretch was caught selling whiskey to soldiers and Indians; his cart was confiscated and the heads of his barrels knocked in,—a punishment

utterly inadequate, as we were obliged the next day to consign to the grave a poor recruit who, under the influence of this vile liquor had wandered off in the snowy blast and frozen to death.

While the storm was at its worst, a detachment of Indian scouts, fourteen in number, (eight Arapahoes and six Sioux) were dispatched on a reconnoissance in the foot-hills of the Big Horn to the West.

The storm abated somewhat before day-break, but all of November 20th there were rough, cold gusts of wind from the north and north-west and occasional "flurries" of snow, but not enough to prevent our red-skinned auxiliaries from holding a delightful series of peace-talks, smokes and dances, in which there was mutual serenading, plenty in quantity, wretched in quality, some present-giving and protestations innumerable of the most affectionate friendship. Had I space, I could fill pages with descriptions of the curious customs brought out on these occasions, and will at an early day crave the attention of my readers while I relate them, but just now we must hurry on to other scenes.

Thirty-four miners from Montana reached Cantonment that day. They were almost starved and had narrowly escaped death in the blizzard. Rations were supplied them and all that the means at hand would permit was done for their comfort.

The reconnoitering party of fourteen Indian scouts whose departure was recorded a day or two back, returned, bringing with them a prisoner, a young Cheyenne warrior, who, seeing them dressed as his own people (they had taken the precaution to leave all military trappings behind), had mistrusted nothing until they had seized and bound him and started back on their long, cold ride of fifty miles to rejoin the main column. He was taken to headquarters, where cross-examination elicited the fact that he was one of a small party living in five lodges near the head of the Crazy Woman's Fork and that if they became alarmed, as they might by his failure to return, they'd surely break across the country to join "Crazy Horse," who was encamped close to our battle-field of the previous June, on the Rosebud, Montana.

The blizzard resumed its fury and the ground this night was covered deep with snow. We didn't mind that much, looking upon it as a benefit rather than a misfortune, because it would give all the better chance of drawing close to the enemy without discovery.

We were to start in the morning, prompt and early, so

all hands were busy in scratching off a line to some of the folks at home: the mail was soon ready, and with the dispatches of the only correspondent who succeeded in catching the command before it started from the railroad—Mr. Roche, of the New York *Herald*—a companionable, scholarly gentleman, who has since abandoned journalism and become possessed of considerable means in Texas,—was securely wrapped and tied in an oil-silk envelope and given to the courier, whose prompt, hearty "Good night, gentlemen," was uttered at the same instant with pull of rein and dash of spur—and in a moment more, he had disappeared in the gloom, to fight his way, as best he might, through snow and sleet, cold and danger of all kinds, back to Fort Fetterman, ninety miles.

A few remarks touching the principal Indian chief accompanying us may be of value.

"Sharp Nose," of the Arapahoes, was tall, straight, of large frame, with piercing eyes, Roman nose, firm jaws and chin and a face inspiring confidence in his ability and determination. His manners were dignified and commanding, coming nearer to the Fenimore Cooper style of Indian than any I had seen since my visit to "Cocheis," the renowned chief of the Chiricahua Apaches, in the Dragoon Mountains, Arizona, in February, 1873.

"Li-heris-oo-li-shar," the Pawnee, had a good face, prominent cheek bones, aquiline nose, large mouth and frank, open eyes, not so piercing as those usually to be noticed among the aborigines. He had the air of a far-seeing, judicious law-giver, one who took note of all he saw and whose advice could be relied on. Yet, he was no lamb, as the outlines of his countenance plainly showed that, if aroused, he would be a bad enemy.

"Tupsi-paw" and "O-ho-a-tay," of the Shoshonees, were crafty old rascals, without much sentiment or romantic imagination lighting up their features.

"Three Bears," of the Sioux, was young in years, but mature in thought. He looked, as he was, a man whose friendship could be relied on. He made no pretensions as a speaker and cut but a poor figure in declamation, when "Sharp Nose" was in the same council. His power as a commander depended more upon the success to be won from stealthy movements and crafty combinations than from any lion-like attack such as "Sharp Nose's" face suggested he might make.

On Wednesday, November 22d, 1876, we moved to the

Crazy Woman's Fork of Powder River, about twenty-five miles from Cantonment Reno; on the banks of that stream at a point where good water, grass and fuel were to be had in abundance, and where an extended view of the surrounding country made surprise difficult, the supply train of wagons was ordered to park and remain, with a strong guard, under Major Furey, the quartermaster. Ten days rations were packed on mules, one hundred rounds of ammunition issued to each man, and all preparations made for swinging loose for a march in search of "Crazy Horse's" village.

During this afternoon, the Indian scouts killed three buffaloes and brought the meat back to camp; this wasn't, by any means, the last time that I saw buffalo on the plains, but I make allusion to the fact as the great herds have now entirely disappeared.

I have just said that General Crook's intention had been to push out from the "Crazy Woman" and strike the camp of the great Sioux chief "Crazy Horse," believed to be then on the upper Rosebud, Montana, near our old battle-field of the previous June. This plan was changed by a trifling circumstance.

Shortly after dawn on the morning of November 23d, a white flag waved from the crest of a bluff in the vicinity of our camp. It was borne by "Sitting Bear," a Cheyenne Indian, who had been dispatched from Red Cloud Agency by Col. J. W. Mason, in advance of the expedition, to bear an ultimatum to the hostiles and ask them to surrender without bloodshed. He was soon at headquarters, with the important information that the capture of the young Cheyenne warrior had alarmed his village, which had started across the hills to join "Crazy Horse." There was, however, he understood, another Cheyenne village, an extremely large one, hidden in the cañons of the Big Horse range near the sources of the "Crazy Woman" the very stream we were on.

To determine the location of this village, to surprise and destroy it, was, in one word, the order of the day. General Mackenzie was ordered to take the Indian scouts and all the cavalry, but one company, and push up the "Crazy Woman's" Fork to its head, and then strike in to the Big Horn mountains and hunt for what fate might have in store for him. All told, Mackenzie had an effective force of exactly eleven hundred officers and men, one-third of the number being Indian scouts. The infantry and artillery companies, and one company of cavalry, the last reserved for employment as couriers and mounted work generally, were

to follow as promptly as possible on the trail of the first division.

Preceding all, by eight or ten miles of distance, was a very small detachment of Indian scouts, selected with special reference to their knowledge of this particular section of country, coolness, good judgment and experience in war.

There are few sights more inspiriting to a military observer than a compact, well-disciplined column of cavalry, "fined down" to a minimum of impedimenta, moving rapidly, silently and with malice aforethought along the trail of an enemy. Especially is such the case when the march is made in the depth of winter, in a flurry of snow, by day or by night, when the fur-clad veterans, gleaming from head to foot in an additional coating of crystal rime, and with heavy beards matted with the ice of frozen breaths, bring back to recollection all the childhood legends of Santa Claus and Jack Frost.

Closing well up on the rear of the column followed the pack-train, each mule and packer selected after an examination alongside of which the severest tests of our much-vaunted civil service seem trivial; but an examination whose rigor will commend itself to all who reflect that upon the absolute, undoubted efficiency of every man and mule depends the celerity and promptness with which the ammunition, rations and blankets of the command are to reach camp each night.

No officer of the United States Army has given the earnest, intelligent attention to the subject of pack-mule transportation as has General Crook; he may, without qualification, be called the apostle of the military pack-train. He recognized the importance of this branch of study, made it his own from Alpha to Omega, introduced military promptness and discipline into the system already prevailing, and had the gratification of seeing his severe labor rewarded by the success attending his campaigning in the mountains and on the plains. There is not a pack-train in the Army to-day which does not trace back its first organization to General Crook in Arizona in 1871, although many years prior to that he had run others on the same principles in Oregon and California.

I don't wish to travel out of my way into a dissertation upon pack-trains and their management; I will introduce only one remark to show with what care a first-class "train" must be organized. No mule, if such a thing can be avoided, will be accepted

by a train-master of experience, when the mouth shows signs of "bridle-wear"—that is, evidence of the animal having been so long used in harness that the constant tugging and pulling on the bridle have worn out the lips at their point of juncture.

The explanation given for this is easy enough to understand. Such an animal cannot slake its thirst half so readily as one whose mouth has not been injured, because much of the water it may take into its mouth while crossing a stream will escape at the sides. Time is nowhere so important an element as on military forced marches: the old pack-master knows that as well as does the oldest general, and therefore rejects, whenever he can, mules of the class I speak of.

The muleteers themselves must be strong, lithe, active, not afraid of hard work, and willing to take cheerfully the roughest kind of knocks. The pack-train is, from first to last, an exotic, imported in the early days of California mining from the Andean slopes of Chile and Peru; the packers whom I met in my first years of service were, with scarcely exceptions enough to emphasize the rule, natives of the two countries named, or of the western States of Mexico. They were a good-natured, merry-hearted set of fellows, ever anxious to render kind services and delighted beyond expression when they happened to run across an officer desirous of jotting down the tender words of their dainty Spanish songs of love disdained and unrequited. To form an opinion from the theme of almost every one of these amorous ditties, the Cavalier of Castilian origin would appear to be an individual of charming qualities of mind and person—one to whose pleadings the proudest and noblest lady should be glad to listen. His voice, his music, his earnest devotion, all, are thrown away upon the dark-eyed witch who lurks in the immediate vicinity of the lattice overlooking his position, but who deigns no sign of acquiescence or approbation. It may be a trifle late in the day for me, a foreigner, to express a withering contempt for this much lauded beauty, insensible to music of an entrancing type, and the occasion, I am certain, of many grievous cases of pneumonia and pleurisy, originating in the exposure of these serenades. I have waited for years, hoping to learn that she had something to say for herself, that there was a woman's side to this distressing story. None has come. All Spanish love-songs point the one moral, and I am, consequently, much against my will, forced to the conclusion that the Spanish lover is a greatly abused individual whom

I advise to turn his back upon the stony-hearted maidens of his fatherland and come to our own glorious country, where the sex is not so refractory.

The first-class packer was, invariably, I might say, a first-class cook, to whose courtesy and forethought I have been on many a cold, chilly night indebted for an invigorating cup of chocolate, or nourishing plate of "frijoles," dishes which are utterly beyond the grasp of our boasted American civilization.

The American is equalled by no people in the world for his ability to comprehend questions of constitutional law, to lay and construct railroads and to organize and manage, sometimes to wreck, great banking institutions; but when it comes to the business of catering to the inner man, he is as stupid and helpless as a baby. Were I to be called upon this moment to choose between a cup of chocolate and a plate of beans prepared by my old friends "Chileno John," or "Lauriano Gomez," and the same viands concocted by Jay Gould or Leland Stanford, I know what my decision would be.

Being indirectly of Spanish origin, it was to be expected that many of the terms used in pack-trains should betray their derivation. This was the case and has only begun to change with very recent years; the words "acémila" for "pack-mule," "macho," used almost in the same sense, "sencero" for "bell-mare," "atajo" for the pack-train itself, "cargo" for the load each animal was to bear, and "cargador" for the official whose duty it was to arrange and distribute these burdens, were as well understood by officers of the Army serving in Arizona and New Mexico in the decade from 1865 to 1875 as their English equivalents.

And this philological survival has an interesting historical significance. Often as I trudged alongside of the pack-trains and listened to "Long Jim" Cook, or "Jim O'Neil," or Tom Moore, or "Hank'n Yank," or some other American overseer or pack-master, as "he his descant wildly thus began," upon the merits of "that thar puss mule," or "you, Keno! you, Billy! g'lang thar," my mind would insensibly revert to the descriptions of the Siege of Grenada, whither Isabella the Catholic ordered the removal of her Court to the newly-erected city of the Holy Faith and brought together more than 15,000 mules to carry rations to her followers.

Every man keeps concealed in his inner heart a small but carefully selected package of vain regrets, which he takes out from

time to time, looks over carefully, and puts back in the arcanum. One of mine, I may here confess, has been the lack of occasion for stringing together all the incidents and adventures, buried in my note-books, in which appear the names of my warm friends, Tom Moore, Jim O'Neil, Hank'n Yank, Delaney, Young, Harry Hawes, Frank Monach, Daily, "Long Jim" Cook and "Short Jim" Cook, Charlie Hopkins, "Lauriano," "Chileno John," José de Leon, Vasquez, Castro, and dozens of other packers; Frank Gruard, Ben Clarke, Al. Seiber, "Big Bat" and "Little Bat" (*i. e.*, Baptiste Pourrier and Baptiste Changrau), Ben Roland, Frank North, Tom Cosgrove, Jack Crawford, and scores of white scouts and guides, not to mention those of purely aboriginal blood.

"Buffalo Bill" Cody and his devoted friend and servant, "Buffalo Chips" White, appear time and again in my pages, always at the front of danger; the former is now too well known to need a word of praise from me, and the latter, poor fellow, sleeps where he fell, not many feet from my side, in the fight at Slim Buttes, Dakota, September 9th, 1876.

My readers will kindly bear with me, I hope, for bringing in with special particularization old "Uncle Dick" Kloster, one of the pack-train veterans now dead and gone. As he presents himself to my recollection, he is clad from head to heel in fur and blanket-lined canvas, a musk-rat cap upon his head, while from eyes to breast depends a snow-white beard, matted like a board with frozen tobacco juice, because it was during the severe privations we underwent together in the campaign in Montana in the early months of 1876, when we were marching on half-rations, with the mercury frozen solid in the thermometer. Every afternoon, the moment the column made camp, out came my note-books, and the events of the day were recorded; in ink, until the severe cold broke the bottle and afterwards, as well as numbed fingers would permit, in lead pencil.

"Uncle Dick" would first look after his mules and then hurry to my side, doing everything in his power to add to my comfort. Sometimes, he would pile up "aparejos" (a form of pack-saddle) to keep the fierce north wind from carrying me away bodily; sometimes, build a fire at my feet, to keep my toes from freezing, but always something.

At last he unbosomed himself. He believed I was going to write a book, "as big as that thar Webster's Dictionary I seed

down to Luke Murrin's s'loon in Shy-an ; " no man could be taking all those notes for nothing, and poor " Uncle Dick," like many of better education, mixed up the two ideas of quantity and quality. He had been on the Pacific Slope, in the Rocky Mountains, in British America and in Mexico, since 1849, had had his own share of " ups and downs," but had never yet " seed " his name in print. Could I—would I—put his name in " the " book ?

When I told the dear old soul that not his name alone, but a full reference to his valuable kindness as well, should appear in a prominent page, the smile that spread over his face cracked the frost on his beard. " Look, Uncle Dick, here's your name, see for yourself." This recognition roused his generous good nature to a paroxysm of enthusiasm ; he multiplied his efforts and ventured every now and then to proffer bits of information, some of it of consequence and some not, but all received most gratefully. I overheard him once confiding to an open-mouthed packer, that " me'n the Cap'n air gettin' up a book 'bout Injuns'n mos' everythin'," and my last parting word from the old man was : " Cap, don't forgit that thar book outfit." No, Uncle Dick, I have not forgotten, and I hope you may be able to read these lines from the ' packer's ' Paradise, to which I am sure you have gone, and where your honest old soul would be grieved did you not find an abundance of grass and water for your mules, no flies to bother them, and the very best of rations for your men—beans and bacon, " yeast powder " bread, dried apples, coffee and chocolate and an occasional " snootful " of something to drive away malaria.

Mackenzie and the cavalry made a rapid march of twelve miles or more up the " Crazy Woman," passing over as fine a pastoral region as is to be found in the world, and then, upon the advice of the Indian scouts, bivouacked in a spot well hidden among the foot-hills of the Big Horn range, to which we had been drawing closer and closer all afternoon. Colder and colder became the night, the stars glinted pitilessly from the inner depths of the blue ether which are hidden from Eastern eyes, but the feeling that we were sure to have a fight of some kind within possibly twenty-four hours, kept blood in circulation and when an electric pulsation of steely gray flashed upwards from the Eastern horizon to herald the near approach of the God of Day, not a man or horse showed the slightest bad effect of the Polar temperature, a fact I recorded with much pleasure in my notes at the time.

We resumed our march as soon as we could discern the trail of our advance detachment which led in towards the Big Horn mountains, going a trifle west of south, as it had on the previous day, and through much the same kind of fine grazing country. For about three hours we moved as rapidly as the frozen ground permitted; the slippery, frost-mantled grass offered no serious obstacle, but we did find all we could do to cross the innumerable "cut-bank" dry beds of streams, every one of which had to be broken down into suitable slopes by which the animals could descend and ascend. The ground was every bit as hard as flint and took up a great deal of valuable time before it would yield to axe or pick, which it frequently broke. Many of these crevices in the surface were not more than fifteen or twenty feet wide, so that the great labor involved in their passage had all the appearance of an unnecessary aggravation of our discomforts. We were growling and grumbling not a little at these troubles when the advance scouts rejoined at a run, and from head of column to rear guard spread the magnetic whisper that the enemy's village had been discovered and was almost under our noses. From the information brought in by the Indian scouts General Mackenzie concluded to halt just where we were until the rising of the moon, and then move slowly and cautiously forward to attack the enemy at daybreak. Our Indians had noted carefully every foot of the way, both going and returning, and knew exactly where to take us. Besides this, two of their number—"Red Shirt" and "Jackass"—had remained behind, hidden among the rocks on the top of a high hill from which coign of vantage everything transpiring in the village below was distinctly visible. I think it only fair to make special allusion to this act of daring and good judgment, for the very excellent reason that many inexperienced and unthinking persons, military as well as civil, have allowed themselves to be drawn into the error of disparaging and depreciating the services of Indian auxiliaries; on this, as on every other occasion of my twenty years close observation of them, they were of the greatest possible help to our soldiery, acting with the whites or singly. As already indicated, they represented on this campaign many different tribes, some of them being Cheyennes, closely related to the people we were soon to fight.

"Red Shirt" is, I think, the same Indian who has within the past year or two accompanied "Buffalo Bill" across the ocean and been presented to her Majesty, Queen Victoria.

There was no shouting, no cheering, no loud talking to show excitement; an old soldier would have known, however, that the news passing along so quietly and yet so swiftly from mouth to mouth was enough to set a civilian's blood on fire, he would have known it from the way men were looking at the fastenings of their saddle-girths and bridles, examining for the last time the action of breech-block and trigger, or making sure that no cartridge should be missing when wanted.

We didn't have very long to wait that short, hazy, bleak November day for the setting of the sun and the coming of our good friend, the moon. The grim bosom of the Big Horn Mountains parted to admit the column into a deep cañon whose vertical walls carved into turrets and battlements by the erosion of time and the elements, proclaimed almost with the eloquence of human tongue that those who entered must leave all hope behind.

Hidden by these lofty pinnacles, the coquettish moon played hide and seek, anon bathing the barrels of carbines and the metal work of bridles in an effulgence of light and again deserting us in darkness so opaque that the gentle glitter of kindly stars seemed to acquire the power of countless suns.

All night long we groped our way, floundering, slipping, struggling over smooth knolls of glassy surface, making the slowest kind of progress, but still advancing. Not a word was spoken above a whisper. Not a match was lighted, and the soldier's faithful friend, his pipe, was not allowed to leave the saddle-bags.

The most stringent orders were given that the column should keep "closed up," and each company as fast as it had worked its way across an unusually difficult ravine passed word to the front of its success and of the whereabouts of the company next behind it.

The Indian scouts manifested much greater anxiety than did their white brethren, probably because they understood the gravity of the situation better. They had calculated that the march to the hostile village could readily be made during the hours of night, but none knew better than they that there was not a moment to be wasted. If our attack could be made in the earliest hours of the morning, taking the enemy completely by surprise, the smaller loss should be on our side; should delays overtake us and the light of the coming day disclose our approach to vigilant and awakened savages, the percentage of loss upon which we might reasonably count was to be reckoned only by the

amount of ammunition the hostile Cheyennes would have to expend in the contest.

So closely was our attention occupied by the task of working a way across the precipitous ravines which seamed and gashed the bottom of the cañon adown which rippled over its rocky bed the waters of the stream, called, as best we could determine, Willow Creek, and which on account of this same rippling were not frozen into solid ice—that our dull ears did not seize upon the ominous thumping of the Cheyenne war drums faithfully but feebly re-echoed by the towering walls which hemmed us in. Not so with the Indian scouts. Their faces might remain stolid and impassive, but every movement of muscle and sinew betrayed a frenzy of suppressed excitement.

One of them nudged me with his elbow and then pointed with his lips up the cañon in a way peculiar to savages. There was no doubt of his meaning; we were within rifle-shot of our quarry, but he wasn't asleep, as we had hoped to find him, but in full possession of his senses and dancing a great War-dance, in celebration of some recent victory. We threw ourselves on the ground and then heard with startling distinctness the thumping of the drums, the sleepy intonation of the tired out "medicine men" and warriors and the patter of languid feet. The dance was almost over, but the dawn had almost come.

(*To be continued.*)

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MOUNTAIN ARTILLERY.

By FIRST LIEUT. C. D. PARKHURST, U. S. A.,
Fourth Artillery.

OF the many important matters affecting the Army, which now are attracting public attention through the press, many things of less moment, perhaps, but still important in themselves, are apt to be overlooked, and among these most surely may be classed Mountain Artillery. I may, therefore, be pardoned for referring to this subject and for calling attention to a most important branch of military art, that has heretofore been almost unknown, or unheard of among ourselves.

That the importance of this arm has always been well understood by military men, we have only to turn to the past to ascertain. Almost from the time of the first introduction of gunpowder, and the search that followed for proper weapons with which to develop this power, we find among the guns used various specimens of mountain artillery and a constant effort to perfect this particular arm is shown through all the centuries that have elapsed since its first inception.

We often hear the saying "there is nothing new under the sun," and this finds its application in the mountain, as well as field-artillery of the present, when compared with that of days gone by. In those early days, with the mountain and field artillery, as well as with the hand weapons in use, breech-loaders were among the first models to be introduced. We also find the "jointed" or "dismountable" gun, with the carriage capable of being taken apart to facilitate its transport on mule-back, and many other ideas which now are being revived and perfected. These first ideas were necessarily abandoned, not through any lack of proper principle, but for want of a proper powder, as well as because of the crude and imperfect workmanship of the day. To-day, with almost perfect mechanism and skilled labor, it would be strange if we could not take up and perfect those old ideas, and produce the modern mountain gun as well as others. But we should give credit to those old designers and

workmen who did the best they knew with their imperfect means, and who failed, when fail they did, for reasons beyond their control.

The very existence of these old guns, made with such care and labor, and the constant effort to perfect them, show, as I have said, that their importance was early recognized and no effort spared to provide mountain artillery. Guns must be had for all kinds of service, and when War calls upon men to fight they must be provided with the necessary arms for mountain use, as well as for the open country. Guns which are suited to the level plains may be wholly unsuited for the all but inaccessible fastnesses of a mountain country to which our enemy may retire, and as the service demands so must the arms be provided.

The past of our own country can afford us but little instruction in the use of mountain artillery. We could not expect it during the Revolution. Then the country was only a poor and struggling cluster of Colonies, but poorly provided with any of the munitions of War. Then *all* artillery was but hardly out of its infancy, and even the best was but poor as compared with that of to-day. During that struggle, no matter how guns may have been dragged hither and yon, no matter how difficult the task of crowning some height, the country was fortunate indeed to possess even what it had, and there was no time, no money, and no absolute necessity for the introduction of mountain artillery.

For years afterwards the artillery, as well as the army at large, had to struggle along in an almost chaotic state as the result of the poverty of the new government, and it does not appear that mountain artillery received any attention or use during the War of 1812.

The first attention that appears to have been given it in this country was shortly before the Mexican War. Probably the matter had received attention for years before in considering what the Army needed, and in following the experiments being made abroad. But, however this may be, the 12 pounder mountain howitzer, model 1841, appears to be the first officially recognized distinctive mountain gun. Others may have been occasionally used in mountain warfare, but with the introduction of this howitzer we had a distinctive weapon for this service, and doubtless it has made a good record in the many years since its adoption.

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But with us, as with other countries, when first these guns were introduced, no effort appears to have been made to give to mountain artillery a distinctive and special organization, or to train men and animals for its proper and greatest use. With our small army, widely scattered over many miles of frontier, all busily engaged in the hard and thankless task of subduing hostile Indians, and opening up our great West, this was all but impossible. In fact, in the greater number of cases, artillery as an organization was entirely absent, and, when necessity demanded it, these mountain howitzers were packed and served by either cavalry or infantry, and the best use possible made of them under very adverse conditions. The records that have been made are, however, so inaccessible, so almost forgotten in their dusty pigeon holes, that, however successful, nothing is known from them beyond the fact that such mountain guns were made, issued and used.

Their record in the Mexican War is also unknown. Brilliant as were the engagements of that campaign, the armies engaged were small, and possibly but little use was made of mountain artillery, no matter how favorable an opportunity parts of the country may have afforded. Our enemies were then but poorly organized, and more poorly equipped. They were torn by internal dissensions that helped to make our victory easy, and perhaps the necessity for mountain artillery was never felt. So also in our Civil War, there were mountain batteries, but they were comparatively few in number, and their record does not show any startling or brilliant features, however hard or well done the work may have been.

The trouble is, and has been, that mountain artillery and mountain guns have never been recognized in our Service as anything but a temporary makeshift. Here and there they have been called into temporary use as occasion demanded, to be disbanded and the lessons learned forgotten as soon as the emergency passed. This does not detract from, but rather adds to the credit due those who have fought with them. Here and there, hard and thankless work has been done in packing and using these guns in our Indian conflicts. With no organization, no experience possibly, with but a poor outfit of animals gathered here, there, or anywhere, with but poor saddles and equipment, with no special training of men or animals, mountain artillery has gone forth, and worked, struggled and fought as best it could,

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every one doing his best. They have learned much as the result of such experience; but the knowledge so gained has soon been lost for want of means to preserve it, and thus we have never long possessed a skilled or organized mountain artillery.

The greater credit is therefore due such work the less has been the possibility of preparation. It is one thing for a finely organized and equipped expedition to achieve success, and quite another and greater thing for a poorly organized and equipped command, through want of means, not *will*, to succeed also; meagre, therefore, as may be all our work with mountain guns it is entitled to great credit and consideration, and it is a pity that the lessons and experiences thus learned by many through many years cannot be preserved and made useful for the future.

Much has been done in a quiet way by many of our officers, and by the Ordnance Department, with a view to perfecting our Service in this regard. But a great part of this has been done more under the idea of a temporary makeshift, for any branch of the Service available, than as a permanent and special organization, fully equipped and ready at all times for mountain service.

With our Artillery School now organized at Fort Riley, has not the time come for regular organization of mountain batteries? This service calls for many special things, not learned in a day, that can best receive attention there. We have yet to learn what is the best method of packing; to devise and perfect all the apparatus necessary for prompt and efficient work in the roughest country; and at this school the time can be taken to conduct the experiments necessary to determine and perfect all the details of organization, equipment, armament, and all the methods of packing, transport, drill and manœuvres, and, besides this to keep the record of success or failure as a guide for future generations.

We doubtless can learn much from a study of foreign methods, equipment, armament, etc. But it is also doubtless true that methods of our own, better suited to our country and ideas would have to be devised. The conditions of a service, and the peculiarities of a people always finally determine the details of all such work, and experience and experiments are necessary to determine what is best suited to particular conditions.

Then again, more than all other services, does that of mountain artillery call for special men and a special organization.

Mountain service of any kind means hard work, and when such service is pack service it calls for special endurance as well

as skill to be able to handle and pack the loads, care for the animals, the rigging and apparatus, and at the same time be skilled in the handling and use of the guns and implements as weapons of war. "Handy" men are needed, men who have a fund of expedients with which to overcome difficulties, men who have a love for mountain life and who can stands its hardships, men who love as well as know the animals they have to use, and are not afraid to be around amongst their possibly lively heels and snapping teeth.

The armament and equipment must largely result from experience and experiment; but, broadly speaking, the gun, though light enough to be packed, must yet possess all the firing qualities possible. Pop-guns are not wanted; but guns as powerful as can be made, and yet packed, so as to have the range and power of fire so essential in modern warfare. Doubtless, much must be sacrificed to great mobility, and the power to climb and reach high positions in the roughest country, for, without this, mountain artillery would be but a name; but within these limits the greatest power possible should be given the guns, so that, if possible, they could play a fair part in open as well as in mountainous country.

We all know the confusion that has obtained in times past from the great variety of calibres that were given to field guns, and the consequent difficulty in the proper supply of ammunition. It would simplify matters greatly, therefore, if our mountain gun, though special in itself and in its uses, could have the same calibre and use the same projectiles as the field guns. Even though a lighter charge were used, as would be the case, there would then be but the one calibre of projectile for the two guns, the mountain gun could doubtless obtain all the range desired by the use of such a projectile and the maximum charge the gun could properly sustain. An element of uncertainty and confusion in the supply of ammunition would thus be eliminated, the supply of projectiles be always certain, so long as any projectiles of that calibre were at hand. The charge could be easily made up from any powder or cartridges obtainable.

In an article of this kind technicalities cannot well be entered into, so all data as to the best gun must be omitted. In broad terms, however, it may be said that successful results have been had in other countries with the "jointed" gun in actual service. These "jointed" or "dismountable" guns take apart, forming two

pieces for pack transportation, and by their use a more powerful gun and better results can be obtained. The transportation has of course to be increased to carry the gun in two parts rather than in one piece; the carriage, too, must be heavier, and possibly dismountable as well, increasing again the number of mules; but the greater results thus obtained seem to justify the extra cost of transportation, and these guns provide a battery that is at once powerful and capable of great service.

Those who are familiar with the pack train service of Arizona and our western frontier will join me in saying that, doubtless, the mule is the best animal for this service. Other countries may use horses, but the mule is by far the hardier, more surefooted, can carry more, is more easily kept in condition, and is in every way the better of the two. No animals but mules, even for riding purposes, should be permitted; then every animal, saddle as well as pack, would be available for pack service when needed, as all the saddle mules could and should be trained to the pack as well as the saddle. And if properly trained and handled they would all be tractable, easily managed and taught to stand fire fearlessly.

The mountain battery, of all others, should be for a maximum of work, and a minimum of show. Everything about the battery should be *for use*, and all as simple as possible and as easily adapted to its purpose as the nature of things will permit. Simplicity and plainness need not mean ugliness, however, and the battery might well be given a certain smart appearance at all times, so that the men might take a proper pride therein.

Even in the roughest of country, trails and roads are often available for long distances. To provide for this the guns and carriages should be, therefore, provided with proper means for draft.

Experience is necessary to say what this draft should be; but it seems to me that any limber is unnecessary and a pole or shaft attachment all that would be required. A limber would be a nuisance except for hauling, and has no other useful purpose. It would be heavy and bulky to pack, and the animals required for that could better be used to carry ammunition or other stores. This has been pretty well worked out abroad, and in no case of mountain artillery, pure and simple, is it used.

The draft animals are already present, for every pack or riding mule can carry a light breast harness and always be available

for draft. As many or as few as may be needed could be hooked on at any time, and the proper relief be given by changing about and not always be using the same mules for one purpose.

If, then, we admit, as I think we must, the necessity for mountain artillery, it would seem that the time has come for something to be done looking to its permanent adoption as a part of our field forces, to the necessary experiments and work to devise and perfect the details of its organization, armament and equipment, and to the necessary instruction of officers and men, so as to provide the proper force in case of need, and enable us to hold our own in mountain warfare.

A TRIP TO INDIA, CHINA AND JAPAN.*

By CAPTAIN SAMUEL M. MILLS, U. S. A.

Fifth Artillery.

IT was my privilege, under the orders of the Government, to spend the winter and spring of 1885–86 in India, China and Japan, and as one of the two officers designated by the War Department, I witnessed the manœuvres of the British Army in India during that winter. I made full notes of what I saw during this trip, which I subsequently submitted to the War Department in the form of a report. There were many incidents and events noted which made an impression upon me, but which might not be altogether suitable to embody in an official report; some of these, it was thought, might be of interest to others, and at the request of the commanding officer, General Tidball, and others, I have put these notes in the form of several papers —the first two, simply a narrative of events and incidents, and the others a detailed description and discussion of the actual operations of the two army corps in the field.

This evening I will read one of the papers I have prepared under the first head, or narrative of the journey.

The facilities of travel which late years have developed, has made a trip to India, or around the world, not a difficult undertaking, but I wish to mention, that in the short time that was allowed me after receipt of orders to complete all arrangements and to reach Suez upon a given day, I could find nowhere any information of the shortest routes or lines of travel by which one could reach this point from this country in a given time, until it occurred to me to consult Cook's Tourists' Guide for Europe, etc., whose office is located in New York, where I had to go to get this information and make arrangements. It was through their office that I learned the hour of departure of the latest Indian mail train from London, which has the right of way through Eu-

*This is one of several papers read some time ago by Captain Mills before the officers of the Artillery School and Post of Fort Monroe, Va.

rope via Mt. Cenis, Bologna, etc., connecting at Brindisi with the Peninsular and Oriental steamers, and thence by rail to Suez, where direct connection was made with another Peninsular and Oriental steamer for India.

The officer, Colonel Lazelle, with whom I was associated during this trip, after receipt of his order, came from Vancouver Barracks, Washington Territory, and just had time to reach New York and catch the last steamer by which he could have reached Suez upon the day fixed by the British Government.

We reached Suez on the day appointed as the latest day for the meeting of the representatives of different nations that had been invited to witness the manœuvres of the British Army and to proceed to India.

The representatives were received on board the steamer *Assam* by Col. John Upperton, C. B., of the Bengal Staff Corps. This officer had recently been in command of the 6th Bengal Cavalry, and had received while in command of this native regiment in the Egyptian campaign of 1882 his C. B. He had been deputed by the Indian Government and sent from India to receive these representatives and provide for their comfort. From this date and until our final departure from India and return arrival at Suez, for those that returned that way, and an equivalent provision for those that did not, all expenses of whatever character in connection with our journey or stay in India, except such gratuitous money or presents, as we gave to servants, was defrayed entirely by the Indian Government, whose guests we were during this time.

The following is a list of the names of the representatives of the different governments deputed to witness the manœuvres in India, also the names of the officers of the British Army detailed to accompany them:

AUSTRIA.—Prince Louis Esterhazy, Lieutenant-Colonel 5th Hussar Regiment.

FRANCE.—Le Colonel Descharmes, Commandant le 19th Regiment de Dragons; Commandant de Torcy, Major de la Division d' Alger.

GERMANY.—Major Von Hagenon; Captain Baron Hoiningen Huene, General Staff of the German Army.

ITALY.—Colonello Brigadiere Seletta; Captain di Valleris, Stato Maggiore.

RUSSIA.—Colonel N. Timler, General Staff Russian Army;

Le Prince Odoïeosky Maslof, Colonel de la Garde á cheval, de S. M. l'Empereur de Russie.

UNITED STATES.—Lieutenant-Colonel H. M. Lazelle, 23d Infantry; Captain S. M. Mills, 5th Artillery.

ON SPECIAL DUTY WITH FOREIGN OFFICERS.

Colonel J. Upperton, C. B., Bengal Staff Corps. Major H. B. MacCall, Kings Royal Rifle Corps. Captain A. Montanaro, 16th, the Lucknow Regiment. Captain C. S. Wheeler, 6th Bengal Cavalry.

The Italian representatives had been serving in Massowah, which place we passed in the Red Sea, they had preceded us to Bombay some days by local steamers; the Austrian representative had also gone on to Bombay before. This prince has since this time visited this country.

General Saletta, the Italian, was the senior officer among the representatives, and very happily responded for us in French, the few occasions that this was necessary. He was a man about 40 years of age, and came from the engineer branch of the Service. The other representative from Italy was a young captain of engineers; neither of these officers spoke English. The two German officers were comparatively young men, the elder and senior in rank, Major Von Hagenon, had been for a short time with the English Army in Egypt in the last campaign, and had there met many English officers serving with the Indian contingent. This officer, when at his proper station, was in command of a battalion of cavalry. He had recently been serving in the Divisional Staff. Was in command of his troop and attached to a battalion that had taken Colonel Descharmes, the French representative, prisoner at the battle of Sedan. He was a man of considerable experience, and had been a representative of his country on other similar occasions; of very attractive manners and person, and spoke in addition to his own language, French, English and Italian. When in full uniform he was covered with medals, one of which was one of the degrees of the Iron Cross. The other German representative was the typical young German staff officer of to-day. A man about 36 years old, graduated and assigned to the Royal Engineers; served with the engineers as a lieutenant during the Franco-Prussian War; staff school three years, graduated and then performed the usual service with artillery, cavalry, infantry and marine artillery, and finally transferred

to the general staff. Was at this time an aide-de-camp to Prince Bismarck. Had been military attaché in London for a time, and had subsequently been sent there, when it was thought England and Russia would have difficulty, to observe military movements. He is apparently held in very high estimation by the German War Office. Is now and has been, since his return from India, German military attaché in Paris, and has recently been promoted to Major. Colonel Descharmes, of the French Dragoons, was probably the oldest officer among the representatives, a man about 52 years old; was wounded and taken prisoner as a captain at Sedan, and held as prisoner of war for a long time; came out of the war a captain, others in active service promoted over him, while he was held as a prisoner. Had served in London and in Japan as French military attaché. Commandant de Torcy,—commandant is not a grade in the French Army, but a title sometimes used which corresponds to chéf or major. He had served a number of years on the staff, and was French military attaché at Constantinople in 1879, where I had previously met him. Had been a long time on duty in Algiers, from which place he had just returned, in the Divisional Staff. He had but recently been assigned to the command of an infantry battalion, due to the recent order abolishing or changing the permanent staff in the French Army. He spoke no language but his own, was a man about 40 years old, and was specially interested in the construction of barracks and hospitals for warm climates, with a view of adopting the ideas in Algiers.

The elder and senior of the two Russians, Colonel Timler, of the General Staff, was a man about 48 years old, had attained his present position by hard work and service in all parts of Russia. Being a Russian, and from the fact that the impression had preceded him that he was a prominent exponent of the Russian idea "On to India," made him a conspicuous representative and much sought after by the English officers in conversation, and natives curious to see a real Russian entertained and living as the guest of the Indian Government, which to them apparently was inconceivable. He was a very adroit diplomat, and I don't believe ever made a mistake or said the wrong word in replying to the many half serious innuendoes levelled at him in a good-natured vein as to what the Russians would do when they took India.

He was a very agreeable man, and a keen observer of military details. He spoke French and German and a very little

English. I had opportunities of performing trifling services for this officer on several occasions, for which he was much pleased. It was Sir Frederick Roberts', the general commanding in India, custom in the field at the close of the manœuvres each day to publicly comment upon the exercises of the day, in the presence of all the prominent officers, including the foreign representatives—the latter, I believe, are not always present on these occasions at the manœuvres in Europe. Sir Frederick, however, made it a special point that the representatives should have this privilege. It was difficult for a foreigner at all times to follow these remarks, and subsequently I would give these comments to this officer.

Prince Odoïeosky, the junior Russian colonel, was a man about 37 years old, of rather a delicate constitution, and easily knocked up by the rough jaunts we frequently had in the field. He wore most beautiful uniforms on occasions of ceremony, and when in uniform was decidedly the conspicuous member of the party.

At Suez were two steamers of the Peninsular and Oriental Steamship Company leaving the same night for the East, one of them going to Colombo via Aden, and thence to China, the other and the one we took went to Bombay via Aden, thence to Colombo, etc. Shortly after our arrival on board the steamer, and after mutual introductions, the steamer weighed anchor and stood down the Gulf of Suez for Aden, with the mountains of Sinai on one side and an Egyptian desert on the other. The Gulf of Suez is so narrow that you have a distinct view of both shores, alike hopelessly sterile, but enchanting in outline and color. The following morning we thought we would see the peak of Mount Sinai, but a mist of clouds prevented the view. We passed the place where it is supposed the Israelites crossed the Red Sea, but the exact location was left a little doubtful in my mind.

This sea is said to be the most oppressive stretch of water on the face of the globe, but on this occasion, the season of course was favorable, we experienced no discomfort, the thermometer ranging from 85° to 90°, but with a breeze. It is said, "In the summer time that the air is like that of a furnace, and the bare red mountains glow like heaps of live coal." We steamed monotonously for five days, the water as still and smooth as that of a lake, without seeing any wrecks, which until recently I believe was quite a common

sight. The navigation of this sea, on account of the numerous shoals and ragged coral patches along the shores, have been the cause of many disasters; the currents are very uncertain, and the coasts have until recently been poorly lighted. We passed Jeddah, the seaport of Mecca, and the imposing looking town of Mocha, from whence we are supposed to get our Mocha coffee, with its numerous mosques with lofty minarets showing out in relief against the purplish looking mountains behind, and finally reached the Straits of Babel Mandeb, the "Gates of Tears," and the Island of Perim, a bare rock of volcanic formation, garrisoned by a small English force, which island completely commands the entrance to the Red Sea and Suez Canal. The acquisition of the Island of Perim by the English was rather singular if true. It is said: "That a French naval commander was sent to seize this island in the name of his government, and being invited to dine on board a vessel in an English squadron, he indiscreetly revealed his mission, an officer at the table immediately after this recollected that he had forgotten something, excused himself, and while the Frenchman was regaled with wine dispatched a ship to capture the barren rock, the importance of which had not before occurred to them. When the Frenchman arrived he found the cross of St George floating over the coveted prize, and with it the command of the Red Sea."

After passing Perim the course is almost due east for about one hundred miles to Aden in the Arabian Sea. "Aden is a barren volcanic rock known as the 'rock of Aden.' The mainland of Arabia presents a level sandy coast with few indentations, and the Bay of Aden is formed by the narrow peninsulas which project from it at right angles, their extremities shooting up suddenly into clusters of black rugged volcanic cones about fifteen hundred feet high." No description can give an idea of the savage sterility of these mountains. "They are masses of cinders and scoria, glowing as if with still unextinguished fires, and the air around them seems to quiver with the heat radiated from their sides. Their forms exhibit all the violence of the convulsion which created them, heaps of burned fragments, cliffs divided by deep fissures, and sharp, inaccessible cones shooting upwards like congealed flames from the rubbish of extinct craters."

This description by an eminent author is not overdrawn. The town and fortress of Aden occupy the Eastern peninsula, and came into possession of the English in 1839. It is under the govern-

ment of India, being a part of the Bombay Presidency. It has been an important place from the earliest days, and in addition to marking one of the points of the "English highway from Europe to Asia," it is an important coaling station, and being a free port of entry, nearly all the products of the borders of the Red Sea are brought there for shipment, the principal of which are, coffee, gum, feathers, pearls and ivory.

As soon as our anchor was dropped in the harbor, we were surrounded by myriads of canoes of all sizes, from those only three feet long and a few inches wide, capable of holding a half grown person, to those holding two or three naked blacks from the opposite shores, who would dive from their boats and fish up silver coins thrown from the steamer, holding it between their white teeth as they came to the surface, and for a sixpence they would dive under the steamer and come up on the opposite side. This, with other natives in boats selling articles made of feathers, pearls and ivory, amused us, until the arrival of the Governor of the Island and Commandant, Brigadier-General Hogg; his actual rank is that of a lieutenant-colonel, there being no grade of brigadier-general in the English Service. He was the civil and military governor combined. He was accompanied by an aide-de-camp, and by Major Wickham, of the Royal Artillery. The aide was a lieutenant of the King's Royal Rifle Corps, the uniform, trimmings, etc., of which is very dark green, black almost, but permitted to wear white in warm climates. This officer was in white trowsers and jacket, with dark green or black helmet, belts, trimmings, etc. I was sure he was wearing regimental mourning, but learned differently before many hours. Major Wickham, the Royal Artillery officer, was completing his tour of duty in India, the last year of which is generally passed at Aden before returning to England. He had but a short time before relinquished command of an elephant battery, which curious organization I subsequently saw something of. He told me many curious things concerning the management of these batteries and how submissively and understandingly elephants would receive some continuous punishments for offenses, such as assisting another elephant to unfasten his chain and escape.

We were invited by the governor to visit the town, cantonments and "tanks," and other civilities were awaiting us, while the steamer was coaling. We went on shore in steam launches, where we found carriages waiting, us; our arrival of course was not

unexpected by this steamer, in fact, we found throughout India the governors of the presidencies and districts through which we would pass had been timely advised by the representatives of the Viceroy of India of our coming, and the entertainments, etc., which would follow. Near the landing were quite a few natives; they are a low variety of the Arab race, with dark brown skins, deep set eyes, long straight noses and handsome curling hair. The town, which is on the other side of the peninsula, contains perhaps 30,000 inhabitants; it is not seen from the landing. The road leading to it is alternately of sand and macadamized volcanic cinders, and follows the curve of the bay towards the northern end of the rock, where there is a strong gate guarded by a sentinel.

This affords the only land communication with the sandy Arabian plains beyond. After two or three miles the road turns inland, ascends the less abrupt slopes of the hills until it reaches an artificial pass about forty feet deep by twenty feet wide, cut through the comb of the central ridge. "This pass is closed by a ponderous double gateway, and the wall of circumvallation crossed by an arch."

An Indian Sepoy, the first we had seen, except one or two on duty with Colonel Upperton, stood guard at the gate, the guard-house was near by. The road was filled with Arabs from the interior, bringing camel loads of their produce to market, and with mongrel natives from the African coast. After passing through this cut, the town of Aden and the cantonments come in view. The town lies in a circular sandy basin almost inclosed by black mountains of volcanic cinder, the buildings are rather spacious huts of wood cane or mud, one story in height. The cantonments for the troops are the usual one-story mud or cane huts laid in lines with streets. The troops at this time consisted of one British regiment of infantry; two Native Indian regiments of infantry; two batteries garrison artillery; one English and one Native company of sappers and miners and one troop Aden horse (militia) for service on the island only. The British troops are changed usually every year, the Native troops every two years. The British troops, same as the officers before spoken of, having nearly finished their Indian service, usually complete their tour on the way home at Aden, before returning to England.

The "tanks," as they are called, are large circular basins of masonry, located at the foot of the gullies in the mountains for collecting water. These tanks were projected many hundred

years before, some of them were never completed, many others were allowed to fall into decay in subsequent periods, but all of them have now I believe been fully restored by the Indian Government. The dry bed of a torrent which divides the town, shows that it sometimes *does rain* even at Aden, though I believe ordinarily it only rains once or twice a year. I was told that it was a matter of record that at a distant period it rained but once in three years. Under these uncertain conditions it is necessary to save all the water and to use it sparingly.

Aden is known as the Gibraltar of the East, and like Gibraltar is now perhaps almost impregnable, but also like "Gib"—as it is called in the East—without being seconded by a fleet might be starved into capitulation. Immense sums of money have been expended on the fortifications and it is still being further defended. It resembles "Gib" in other respects, which I will not now stop to describe.

We returned from our drive and inspection late in the evening to "Government House" and dined with the Governor-General. As this was the first of the many formal dinners we had in the East, the surroundings left an impression on my mind. Government House is the residence of the person performing the functions of governor or senior representative of the British Government throughout all the Colonies. At Aden it is situated on high ground overlooking the sea, is a large single story "Bungalow," with heavy thatched roof, the eaves of which nearly reach the ground. The interior is divided by light partitions or screens of different colored hangings, into the various rooms for habitable purposes. The rooms were lighted by lamps of varied colored shades; the presence of ladies in light summer silks, the officers in white duck jackets and trowsers—we had left five inches of snow at Brindisi,—the Indian servants in white, with picturesque white turbans or "puggries," with bare feet moving noiselessly about on the matting covered cement floor, and the quiet swinging of the "punkha" suspended over the table to keep the air in motion, all gave an oriental or strange appearance to the scene which viewed for the first time left its impression. There were twenty-two that sat down to dinner, nine of our own party, and the remainder made up by the officers of the station, their wives and lady friends spending the winter there. Soon after dinner and our return on board we weighed anchor and had our last view of "Araby the blest," and for seven more monotonous

days we saw no signs of land, until we approached the Malabar Coast and entered the Bay of Bombay.

The approach to Bombay is very attractive. The following quotation gives an idea: "A considerable extent of the coast north and south is visible, the mountains picturesque and beautiful in their forms, and exhibiting in their drapery of forests a marked contrast to the desert hills of Arabia, which we had last seen. We were very soon near enough to distinguish the dwellings of the residents on 'Malabar Hill,' where the Europeans principally live, and the groves of cocoa-nut and date trees which cover the islands. The bay opens beautifully as we steam in. It lies between the islands of Bombay and Salsette and the mainland, and is perhaps twenty miles in length. Both shores are mountainous and thickly covered with the palmy growths of the tropics." Before reaching Bombay, while on board the steamer, we had received many insights into Indian life. The servants were all Indian Portuguese, and most of the passengers were officers of the Indian Army and civil-service men returning from leaves of absence, so that the novelty of first arrival in a strange land and in the midst of another race of people was somewhat lost, besides, as the guests of the nation, we were not permitted the experience that one gathers in visiting a new country for the first time, as everything was prepared by others and in advance for us. This, of course, was a great convenience and saving of much time and annoyance, but the ordinary traveller would encounter many experiences in making his way among the people that we did not have.

At Bombay we were met by another officer, Captain Montanaro, detailed to accompany us. He belonged to the Indian Army and spoke Italian. We spent several days in Bombay very pleasantly, the recipients of many attentions from Lord Reay, the Governor-General of the Bombay Presidency, the Provisional Commander-in-chief, Sir Robert Phayre, and other officials, and also from the different clubs, which are largely composed of officers and high civil-service men. General Phayre gave a large dinner party in our honor, and after dinner a "Shaminana," or open air concert or reception (December 30th) to which all the officers in Bombay and many prominent natives were invited. This was given at the "Cooperage," an historic spot, and under canvas, General Phayre and many of the officers living there in tents. Four bands were massed and under one

leader furnished the music. At Lord Reay's dinner party, the following evening, at Government House, on Malabar Hill, some seventy persons, mostly official, which included the consuls of different countries, sat down to dinner, but one lady was present —Lady Reay. Lord Reay, on this occasion, delivered an address of welcome in French, being an accomplished French scholar, to which General Saletta, of the foreign officers, replied. This was one of the few occasions upon which any formal speeches were made or expected. At all formal dinners, though, or when there was present with us any prominent English official, whether in camp, in the field, or cantonment, after the cloth had been removed, there would be placed on the table by the side of the presiding officer decanters of sherry, Burgundy, Madeira and claret, the person presiding, after helping himself from one of the four decanters, would pass them to the next person, who, after helping himself from one of the four, would pass them on, until all the guests had been helped, after which, upon intimation, all would rise, including ladies, if present, and drink to the toast "To the Queen, God bless her," at which the band would strike up the national anthem. All would remain standing during the playing of the first bar.

This custom prevails throughout the English Service; I have seen it at Woolwich and also at Hong-Kong. After this toast very little time is spent at table, and at no time is there excessive drinking there. Later though, and after adjourning to another part of the house, those that desired could find cigars and a "peg," or brandy and soda. "Pegs" are the usual drinks after dinner or at other times. A "peg" is Scotch whisky and soda or ærated water, which is now generally used throughout India, the latter being made in many places in India, and is much cheaper than soda water. The days of excessive drinking in India have passed so far as my observation extended. I saw none of it among army men or officials, nor evidences of it throughout my stay. I did hear though that certain missionaries had found a very large and more successful field of labor in the temperance cause among Europeans than in the conversion of the Hindoo.

Upon arrival at Bombay each officer of the party was provided with a Portuguese servant. These people are employed almost exclusively for this kind of service. They are indigenous to Bombay; all speak a little English, and are more or less

familiar with the various Indian dialects, which it is important to know in making a tour through India. I do not know what other languages these servants could speak, but the Russians, Germans, Italians, French and other representatives seemed to get on quite as well with them in their respective languages as we did. But fortunately it is only necessary to know a few words of the language of one in that capacity, the little intercourse outside of the usual routine, can generally be supplied by gestures, vigorous tone of voice, and exclamations. One thing, though, which saved us the necessity of supplying our servants with much information, was that we did everything as a party, were all invited on the same occasion, and after they were taught what would be the dress—for it must be remembered that we did not always adopt the same, for we represented many nationalities—Colonel Upperton would notify the head servant what we intended to do during the day, and this information would be communicated to them all, and this knowledge was often very useful in keeping us to the appointments.

The social obligations were many, but always pleasant and agreeable, and happy man was he that was blessed with a good digestion and a level head, for the hospitality was unbounded and continued for two months. If I am not taking up too much time on the subject of servants, let me say that this particular class of servants are not troubled with any particular caste prejudices as to the character of work they perform.

The Hindoo, for instance, we had many of them in the field with us, would not serve wine or meat, and only a very *low* caste Hindoo would perform the labor of "Bheesties," or water carriers, so that these Indian Portuguese are very useful as servants. Another feature of Indian social life may be a matter of surprise to you; an invitation to dinner at a private house or club includes your servant, as a servant, of course. I was surprised at our first dinner at the Bombay Yacht Club, to find my servant standing behind my chair, he waits only upon his "Sahib." At Government House private servants are not allowed, the domestics belonging to the establishment perform all the service.

While in Bombay we were located at one of the large hotels, at other places in India we had—while in the field and cantonment—our own camp, known as Foreign Officers' Camp, and when not in camp were generally put up at one of the large clubs of the place where for the time being we would stop. These clubs

form such a prominent feature of life in India, and in fact throughout the English Service, that I will refer to them further on.

While in Bombay we were afforded many facilities for sight-seeing, and one of the most interesting was a visit to the Caves of Elephanta, located on an island of that name some seven miles distant. Colonel Upperton and the officers associated with him made all arrangements for this and other excursions we frequently made during our stay in India.

A very convenient provision was made for us while in Bombay and at other places where we stopped for any time, and that was providing the representatives of each country with a carriage to themselves, and which at all hours was in readiness, standing before the hotel or club for our personal use. I have read that it is impossible to determine at what time the temples of Elephanta were excavated; there are no inscriptions, the Portuguese destroyed them, and no chronicler has written upon the altars B. C. so and so, as is found in Egypt, so we are entirely at liberty to retrace the ages even to the days of giants to ascertain their origin.

Some archæologists though, I believe, find a striking resemblance between these works and the vaults cut in the rocks of Nubia; in the shape of the columns, ornaments and idols. If these exist, and I believe there are other points of similarity, then it would seem their origin does not date further back than the ninth century of our era. Formerly there stood at the base of the mountain an immense stone elephant, which gave the name to the island and the caves; this, though, has entirely disappeared.

A long flight of stone steps leads from the landing to the entrance of the cave near the top of the mountain, and on the occasion of this visit was infested with beggar children. Near the entrance to the cave is a house in which lives an old pensioned sergeant of the former East India Service with his family, who has charge of the caves and charges a small sum of money for admission.

I will quote the following description of these caves and legends attached thereto, which presents it as it appeared to me:

"Massive columns which seem to be sustaining the mountain, form great square gateways to the entrance of the temple. Rows of columns, losing themselves in the darkness, support a huge

ceiling above which, and as it were crushing it, appears the enormous mass of the mountain.

"The plan of the excavation is that of a cross with arms of equal length. The greatest length of the hall is about 144 feet, and the ceiling is supported by forty-two columns, sixteen or eighteen feet in height, of which more than half have now disappeared. The capitals of these columns are cut in the form of round cushions, pressed down as by the enormous weight above into the shape of beams, which pass from column to column and appear to constitute a framework of timber. The order of these columns is considered one of the most beautiful that the Hindoos have ever imagined.

"The grand and imposing piece of sculpture that confronts you as you enter the temple represents, it is supposed, the three deities of the Hindoo faith, viz., Brahma the Creator, Vishnu the Preserver, and Siva the Destroyer. It is a triple bust twelve feet high. The central head is Brahma, on his right hand is Vishnu, and on his left is Siva.

"This idol has been for a long time the subject of much discussion among archæologists. Some recognize it as described above, others claiming to find in it all the attributes of the God Mahadeo or Siva, to whom the whole temple appears to have been consecrated. This opinion now, I believe, no longer admits of much doubt, for besides the fact that the Hindoos have scarcely a temple to Brahma, the statues which cover the walls all belong to the worship of Siva. The principal face of the idol is calm and benevolent, and, although mutilated, full of expression. The forehead is covered with a lofty diadem in the shape of a mitre, adorned with delicate carvings, in imitation of necklaces and trinkets.

"The figure on the right expresses rage, the mouth contorted with grimaces. The mitre is covered with serpents and skulls, the hand is held out from the altar grasping a cobra with its hood extended, an emblem of Siva in his manifestations as destroyer. The figure on the left is smiling and holds in his hands a flower.

"On the right of this triple bust and facing one of the lateral passages is the sanctuary, the most hallowed spot, in which is placed the *lingam* or emblem of Siva." This symbol is met with so often in India, in by-ways and unexpected places, subterranean passages at Allahabad, and even at Penang, on the road-

side that leads to the Falls, in a little covered temple only two or three feet high, that a few words of description may be of interest. "Here is a small chamber, in the centre of which is found this adored emblem. It consists of a stone pillar or circular column about four feet high (the dimensions in other temples are much smaller) rounded at the top, and placed upon another stone (slab) of circular form, called Yoni, having a small trench round it to carry off the water with which the faithful be sprinkle it.

"The 'lingam' represents Siva in his mysterious emblem of generation, and the Yoni is that of reproduction.

"The Brahmins, rejecting every evil interpretation of these symbols, see only the principles of nature personified in their various attributes. To the eyes of the common people the 'lingam' represents Siva, and the Yoni his wife Parvati. This chapel is the true temple, where prayers are offered up and oblations made, while the immense chamber which surrounds it is merely a magnificent accessory.

"This immense temple has been entirely carved out of the mountain rock; chambers, ceilings, columns, statues all form part of the natural mass.

"The columns whose surfaces are most exposed have been gradually worn away by the water which infiltrates through the vaulted roof or accumulates in the hall during the rainy season."

There are many other passages, chapels and figures; those mentioned are the most important. Some parts of the ceiling and walls in the main hall show traces of color, which would indicate that all the interior might have been decorated with paintings. This temple has been abandoned for more than three centuries, and although they still hold a small annual fair, during which the great emblem is covered with flowers and adored, the Hindoos consider that it has lost all its sanctity. We spent the greater portion of the day wandering about and noting the beautiful views of the harbor and surrounding islands and returned to Bombay in the evening.

A drive through the Indian, or native town, called by Europeans "Black Town," is full of interest. On entering its huge bazaars for the first time you are almost deafened by the din that prevails, and half suffocated by the smells. A heavy perfume of "ghee," or grease, which is exhaled from numerous shops be-

longing to the poorer class of confectioners, almost turns the stomach. In spite of these you cannot help being interested in these famous bazaars.

"A world of peoples and races of perfectly distinct types and costumes are crowded together in the streets of this capital, which supplies the products of Europe to two-thirds of India."

Bombay is the port of arrival for all who come from Persia, from Arabia, from Afghanistan, and the coast of Africa, and from here the pilgrims from Hindostan bound for Mecca, Karbala or Nujiff take their departure.

Besides the indigenous races which still present such varieties we see the Persian with his high cap of astrakan, the Tomali negro, the Chinese, the Burmese and Malay. This diversity gives to the crowd a peculiar stamp which no other town in the world can present. The Hindoo fakir, naked and hideously painted, elbows the Portuguese priest in his sable robe. The natives of Cabul and Scinde raise their voices in rivalry with the Hindoos, Mussulman and Parsees. The Tower of Babel could not have assembled a more complete collection of the human race.

Palanquins, native carriages surmounted by domes of red cloth, pass you in the street, drawn by beautiful oxen from Surat, covered with bells, as well as handsome open carriages from Paris and London.

The streets are bordered by small booths, the flooring of which, raised several feet above the roadway, serves for counter and stall.

The most diverse branches of industry are displayed side by side, but the most notable are the shops or manufactures in sandal-wood, ebony furniture, and works of art in copper.

In this part of the town is located the famous Arab stables, which we visited. These stables supply all the magnificent and costly horses used on the island and many for the English Service. Several officers are stationed here for the purpose of inspecting and purchasing. Here are found the finest horses of the East, most of them come from the provinces bordering on the Persian Gulf, Kittywar and that of Cabul, but the purest arabs, I believe, come from Dowfeb and Nedjed. Their value ranges for the purest or best from $500 to $1,000, and for the more inferior $200 and less.

The horses for the British cavalry regiments are bred in Australia, and are called "Walers;" they resemble our Kentucky

horses. For the native cavalry regiments they use a cross between the native horse and Arab. They are small but very serviceable. The English officers use these horses for ordinary field service and for drilling, and reserve their "Walers" for occasions of ceremony, inspections, etc., when they are *required* to be thus mounted. The "Walers" cost from $240 to $300.

HEAVY ARTILLERY TARGET PRACTICE.

By LIEUT. S. M. FOOTE, U. S. A.

Fourth Artillery.

SMALL-ARM target practice has reached such a state of perfection in the Army that we naturally turn to Blunt's Manual for assistance in determining regulations for a system of heavy artillery target practice. But the artillery student soon finds that the problem is too complicated for solution by such assimilation.

For small-arm practice the pieces are small and as nearly alike as it is possible for skilled workmen and machinery to make them. The ammunition is small and uniform. The ranges are small and the targets are such as to show the deviations of shots to fractions of an inch if desired. The ranges in yards are accurately marked upon the sights, which are so constructed as to compensate for drift. All necessary calculations can, therefore, be made beforehand, without fear that in another piece or in another issue of ammunition they will be found to be inaccurate. The ranges at different posts can all be the same. A great enough number of shots can be fired to thoroughly test each man's shooting capacity.

For heavy artillery, on the other hand, the pieces and projectiles are large and cannot, therefore, be made so uniform. The amount of powder is large and is never two days in the same condition. The ranges are great and cannot be made the same at all posts, nor the same at any one post, for two successive hours. The number of shots must be small, so that the most must be learned from each shot.

The rifleman has very little theory and a great deal of practice: the artillerist a great deal of theory and very little practice.

RANGE TABLES.

The range tables constructed for the various pieces, are in reality constructed for one piece, one projectile, one powder, one carriage, one condition of the air, etc., and are only approxi-

mately true for other pieces of the same calibre and under other conditions.

For accurate shooting, and as a matter of instruction, separate range tables should be constructed for each class of pieces at each post, each season, with corrections to be applied for changes in the barometer and thermometer.

I shall contrive to show the simplest possible construction of a range table, taking the equations from the "Hand-book" of Capt. Jas. M. Ingalls, 1st Artillery, Instructor of Ballistics at the Artillery School at Fort Monroe.

In all these equations the muzzle velocity enters, so that I shall begin with that. Very few posts have chronographs for determining this velocity directly. I shall, therefore, point out a method that can be employed at all posts.

Fire a series of four or five shots under as near as possible the same conditions as will apply during the practice season—same gun and carriage, same kind and weight of projectile, same density of loading, etc. Give, with the sight, exactly the same elevation each time, and be sure that the ranges are accurately plotted. Take the mean range as the correct one, and the elevation as that given. Compute the initial velocity by these equations:

$$A = \frac{\sin 2\varphi}{C}$$

$$z = \frac{X}{C}$$

in which φ is the angle of elevation and X the range. $C = \frac{\delta_1}{\delta} \cdot \frac{\omega}{d^2}$, in which ω is the weight of the projectile in pounds, d its diameter in inches, and $\frac{\delta_1}{\delta}$ is a factor depending upon the density of the air, the value of which can be taken directly from Table IV., Ingalls' Hand-book, for any barometrical and thermometrical reading. A and z being thus obtained, V, the initial velocity, is taken directly from Table A. Ingalls' Hand-book.

The following equations give the other elements of the range table:

The remaining velocity is obtained by

$$S(v) = S(V) + \frac{X}{C}$$

in which small v is the remaining velocity and S(v) and S(V) are

values of functions of v and V, from which v and V can be found in Ingalls' Tables. The angle of fall is obtained from

$$\tan \omega = \frac{C}{2 \cos^2 \varphi} \left\{ I(v) - \frac{A(v) - A(V)}{S(v) - S(V)} \right\}$$

and the time of flight from

$$T = \frac{C}{\cos \varphi} \left\{ T(v) - T(V) \right\}$$

by the aid of Ingalls' Tables.

Obtaining or assuming any two of the unknown quantities in the above equations, the others may be obtained by a solution of the equations.

All the data with regard to the condition of the piece, charge, etc., should be carefully kept, to compare with that of other pieces or for future reference.

The values of small v obtained above may be made more accurate by multiplying by cos φ sec ω.

$\frac{Wv^2}{2g}$ is the striking energy in foot pounds.

The drift is given nearly enough in the usual range tables, but can be computed if desired from formulas given in Ingalls' Handbook.

A range table determined for any piece should serve for all pieces of that class at the post for the season.

The ammunition for the shots to construct the range tables should be taken equitably from the allowance of all the batteries firing at the post, in case no extra allowance is made for that purpose.

CHART.

Every post has, or soon will have, an accurate chart of its surroundings. If this chart is drawn to the scale of 100 yards to the inch (as directed in Army orders) it may be found unwieldy. The 12-inch rifled mortar has a range of 10,000 yards. This would make the chart 200 inches, or over 16 feet square. 200 to 500 yards to the inch would seem to be large enough, and would make the map more convenient for use, especially at Division and Army headquarters.

The map of the fortifications, batteries, channels, harbors, islands, etc., should not be confused with the chart for use upon a plotting board. The former must be in a single piece, drawn

to a scale such as to give a comprehensive view of the entire situation. The latter may be changed so as to bring different parts of the map upon the board as may be desired, the scale being 100 yards to the inch. The former is for the commanding officer of the fort, the latter for commanding officers of batteries.

Again, it is directed that the map be divided into 100 yard squares by lines parallel to the edges of the map and numbered from the upper left hand corner down, and to the right. I suggest that the map be divided by east and west and north and south lines, and be numbered by figures in one direction and letters in the other. This method will prevent confusion, give a permanent designation to each square, enable one readily to orient himself on any chart, and permit the chart to be extended in any direction without changing the whole numbering.

BASE LINES.

There should be more than one base line at each post, for several reasons. In the first place some accident might happen to one station, and it should then be possible to substitute another without delay. If the target has such a position with reference to the base line as to make the triangle very irregular, results will be inaccurate. The nearer the observers are to the target the better. If only one can be near the target the other should be near the gun. The one near the target can be depended on for range and the one near the gun for deviation.

TARGET.

The method of constructing and anchoring sea-coast targets is given in Tidball's Manual, section 409.

OBSERVING INSTRUMENTS.

Azimuth instruments, reading to one minute, are used at the base ends. They must be provided with detachable telescopes, because the object sighted at to orient the instrument may be beyond the vision of the naked eye. In tracking vessels the telescope should be used so as not to sight at the wrong ship and so as to sight at a designated part of the ship. But for taking the splash of a shot the open alidade is better, as the field of view is wider and there is no danger of losing a shot. It is more accurate to catch the column of water in the air than to try to bisect the foam left on the surface.

PLOTTING BOARD.

For a plotting board that can be quickly obtained and shall be accurate, make a drawing-board as large as shall be necessary to contain, at a scale of 100 yards to the inch, the batteries to be fired from, the bases to be used, and the field of fire. Obtain section paper ruled into square inches and made in rolls 20 inches wide. (It costs about 30 cents per yard.) Cover the board with this, being careful to give the lines the proper direction to get the desired portion of the chart on the board. Number and letter the squares from the chart, and draw in the bases, batteries, ship channels, etc. For use at the base ends obtain two circular protractors of about five inches radius and reading by a vernier to minutes. (They cost $20 each.) Have two holes drilled through the cross-piece and two through the rim of the protractor, and put wood-screws through them into the board, to hold the protractor firmly in place. Have the arm fitted with an extension arm three or four feet long. Set the protractors at the base ends with their zeros in the proper direction. A metallic arm about four feet long, graduated to fiftieths of an inch, and pivoted at the position of the gun will give the range to one yard. Use a scale about four inches long to obtain the deviations. The deviation should be measured at the position of the target. The observers at the base ends first send to the plotting board the angles of the target. It is plotted and the range given to the officer in charge of the firing. As a shot strikes, the angles of the splash are taken and sent to the plotting board, where the shot is plotted and the range and deviations—lateral and absolute—are measured and given to the recorder, who is provided with blank record sheets.

FIGURE OF MERIT.

In order to fix upon a figure of merit that shall be fair for all, the practice of different batteries must be as nearly as possible under the same circumstances. The same number of shots should be fired by each battery, at each range, with each piece.

The ranges should be 2,000 yards for the 10-inch smooth-bore, the 4.5-inch siege rifle, and the 10-inch sea-coast mortar; 3,000 yards for the 15-inch smooth-bore, 8-inch converted rifle, and 13-inch sea-coast mortar. These ranges are well within the power of the guns, and by assigning the guns to ranges according to their power it gives to all shots more nearly an equal value. But it will not be possible to anchor targets always at exactly 2,000 or 3,000

yards, so that we should have some method of reducing shots to a common range, for comparison. From the records of actual practice I find that both the lateral and longitudinal errors increase more rapidly than the range. I suggest the following method of reducing a shot from one range to another:

$$D = d\left(1 + \frac{\text{Difference in range}}{1{,}000}\right)$$

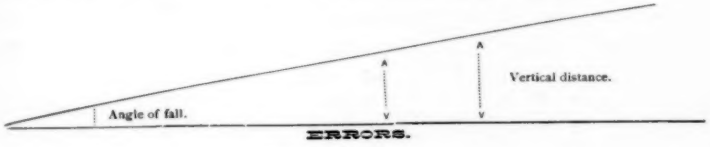
in which D is the longer and d is the shorter range. I have derived this rule from the records of both mortar and gun fire, and I believe it will be found approximately correct with all our present armament. Let all shots fired at targets near 2,000 yards in range be reduced to 2,000 yards in making up the figure of merit, and similarly for the 3,000 yard range. If loaded shell are fired with time fuses they should not be considered in making up the figure of merit, as the fuses can never be depended upon.

Let the area of the 25 per cent. rectangle, the target being assumed as the centre of the rectangle, determine the figure of merit.

To obtain this rectangle, find the numerical sum of all the lateral deviations, divide by the number of shots fired and multiply the quotient by 1.69, the result will be the width of the 25 per cent. rectangle. Similarly find its length. The product of the length and breadth gives the figure of merit of the battery.

PLOTTED RECORD.

Let the record be plotted on the scale of 10 yards to the inch. Take 1 yard of section paper, 20 inches wide, ruled into tenth inch squares. (This can be obtained for 30 cents per yard.) 15 inches from the bottom and 10 inches from the side, mark the position of the target and plot the shots reduced to 2,000 and 3,000 yard ranges, 10 inches from the side and 3 inches from the top, mark the vertical projection of the target and through it draw the ground line. Multiply each error in range by the tangent of the angle of fall at 2,000 or 3,000 yards. This gives the height or depth at which the shot would have struck the vertical plane through the target. Then plot the shots vertically. These vertical distances can readily be determined graphically:



Designate solid shots by a circle filled in –●–; shell by a circumference –o–; shots at 3,000 yards by red, those at 2,000 yards by black ink.

Designate shots from the rifles by one pair of radial marks –●–, –o–; those from mortars by two pairs. Mark the probable rectangle for 2,000 yards in black, for 3,000 yards in red, and the figure of merit rectangle in blue.

It would stimulate practice if badges were given to the battery making the best record at each instruction post, and a trophy to be held by the battery making the best record in the Army.

ESPRIT DE CORPS.

By CAPTAIN CHARLES KING,

United States Army.

WHAT a cry went up in the British Army when the fiat went forth a few years since, depriving those proud old regiments of the line of the designations they had borne for twice a century! With what sorrow were the old colors, with their blazoned numbers, sent back to "Horse Guards" and with what wild wonderment were the new received! How strange it seems to those who have read and revelled in the history and traditions of that most gallant, if often most misled of armies, to see no more in print of the doings of the 55th, the 88th—dashing old "Faugh a Ballaghs;" the 28th, they of the Square at Quatre Bras and Waterloo; the 1st, the 44th, the 9th, 21st and 47th, all old and war-tried foot regiments—and then the Highlanders—the 42d, the blessed old 93d—Colin Campbell's pets, he who never addressed them except by their numerical designation! Where are all the old numbers now? Gone to be replaced by such clumsy appellations as the South Staffordshire Light Infantry, the Northumberland Fusiliers, the West Middlesex Sharpshooters, and the "Horse Guards" only knows what all.

Of course, we know that many a "corps" that bore aloft its number on its colors, had none the less some pet name in which it took pride—notably the Highlanders—and by the same token were there not others like the 50th that struggled under *sobriquets* most undeserved? But the 88th were "The Connaught Rangers," the 25th "The Kings Own Borderers," the 42d, the famous "Black Watch;" and then we had the "Royal Scots," the "Cameron Highlanders," the "Sutherland Highlanders," the "Buffs," and so on *ad infinitum*, almost, but one *must* draw the line with the limits of the Army. How those fellows must have felt when their old names and numbers were stripped at the whim of a new War Ministry! Is there any one in our Service competent to say?

Of course, with their cavalry, it was different. To be sure,

some of the merry old Light Dragoon regiments of the Peninsula and Charley O'Malley days had been transmogrified into hussars, or lancers, but the change was not great. Think of the glorious trio that made up Ponsonby's Heavy Brigade at Waterloo and then, under gallant Scarlett, whipped ten times their weight at Balaklava—"The Union Brigade" where the rose, the shamrock and thistle charged side by side. The Royals of England, the Inniskillens of Ireland and the Scots' Greys whose "terrible grey horses" made Napoleon wince at Waterloo. What soldier would not glory in pointing to the number of his regiment of Heavies, and saying I am of the "K. D. G's."—or the Royals—or the Scots' Greys!

Then take the beautiful Light Brigade, they whom Lucan launched and Cardigan led to their fruitless sacrifice. The world never saw jauntier horsemen than those fellows of the 8th or 11th Hussars, or the 17th Lancers—the "Death or Glories" whose snow-white plastrons have gleamed all over the globe. They at any rate, preserve their numbers and the concomitant "honors." So, too, in the French—so, too, in the German Service.

"These legends and traditions" attached to regiments that have won a name are handed down from generation to generation, and every youngster joining has to study them up and pass his "quizzing" on any and all material points, or he is no true soldier. Is it not the custom in the Prussian Service for one regiment at least—the 1st Guard Fusiliers—to turn out on State occasions in the towering, stately, visorless, high pointed and ornate head-dress—resembling more the mitre of a bishop of the Greek Church than any martial top-piece—that was worn by this regiment in the days of Frederick the Great, and doubtless introduced among his impressed Potsdammers by his royal father? Do they not even now, when on review, march past with the utterly absurd goose-step required of them in 1750? "It keeps up the regimental tradition." That is all it is for, say they. But looking about us, it strikes the writer that it is a great deal—a very great deal.

What have we in the Service of the United States to foster *Esprit de Corps?*—to preserve regimental tradition?

No distinctive uniform, of course; no "from-time-immemorial-head-gear" like the Scots' Greys or the Coldstreams. No peculiar facings that tell the looker on "Ah! there goes the —th. They're the fellows that held the 'Molino,'" or "Look there!

That means he belongs to the Seventh. They lost half their number in one Indian fight years ago." We have few banners, colors or standards to speak of. Old England brings (she says "fetches") hers reverently home and places them with pomp and prayer and ceremony and presented arms and uncovered heads, high on the inner walls of her grand old churches. We, when ours become downright shabby, get a new set, after six months' correspondence and the Lord only knows how many endorsements; but what becomes of the old ones—who can say?

After all who seems to care much, anyhow? About the only time we ever saw them was when we went to call on Mrs. Colonel and noted them still eking out the feeble frontier ornamentation of the rather cheerless room. They looked a little more in need of dusting, perhaps, but did we ever see them brought forth under escort of "such a company" and received with wholesale honors? Did we really have a color-bearer selected, with his corporals, "from those most distinguished for bravery, and for precision under arms and in marching"?—And did they have any distinctive badge? Well—in a few regiments—with "live" colonels, yes; but in most cases, I fear me, no.

But we have some regiments, *Laus Deo!* in which tradition and legend and fellowship seem to go hand in hand. I love to get a letter from a Second Cavalryman and see its soldier crest and the motto "Toujours Prêt" on the envelope. It has its proud story written out in full, and Rodenbough and his comrades have told its glorious past. The divided days of the Seventh are gone forever, please God, and a splendid regiment, one in pride and purpose, has sprung from the thrilling episodes of its early history. Yet who is to gather and edit those scattered records of savage fight, cruel suffering and final triumph. Price, long before they laid him in his grave, put his shoulder to the wheel (and his hand in his pocket) and gave us a compilation of the regimental returns of the Fifth (Cavalry). Wilhelm has done the same for the gallant old Eighth Infantry. Powell told the story of his old love—the Fourth—before promotion took him from it; and even one of those "aggregations of batteries," the First Artillery, has found its Boswell in Major Haskin.

None the less, regimental histories are few and far between. Young officers entering the Service to-day, look in vain in the dusty shelves of the regimental library, for some book or pamphlet which will give them an inkling of the past service of the command

with which their lot is to be cast until they have doubled the years of the life now so full of enthusiasm. Finding nothing, they apply to some graybeard among the field officers or captains. "Tell me something of the service of the Steenth. Where was it during the War?" And in nine cases out of ten he will come away disappointed. "I don't know." "I wasn't with it during the War. The 'nth' was my regiment then." Or, "I was commanding a brigade of volunteers. I don't know who CAN tell you, unless you ask old Spigots, yonder. Seems to me he was Regimental Quartermaster in those days."

There is many a reason why our officers have not been to blame in this matter. The reorganization of '71 resulted in such a shaking up and reshaking that, as one gallant soldier of the "old Army" remarked in answer to a query: "What regiment do I belong to? Well, I have been borne on the rolls of four different ones in the last sixty days, and I'm d——d if I know which to report to."

The policy adopted by the Government in stationing its troops on the great frontier for years, after the Civil War, is another. Regiments were broken up and scattered broadcast over an entire department, merged with troops of other commands; placed under the orders of field officers of totally different organizations, and such a thing as *esprit de corps* knocked higher than any kite the famous Gilderoy ever dreamed of. In one four-company post has it not happened that no two of the companies (including cavalry troops) belonged to the same regiment? Other reasons—indifference due to long years of knock-about service on part of the seniors and sarcastic rebuffs at the expense of the juniors; the transfer on promotion of field officers to regiments, in which they found themselves as much at home as a cat in a strange garret; the absence of any distinctive regimental march to be played by the band when half a dozen companies got together on some surprising occasion. All these and others have tended to stifle the growth of the precious vine that thrives with such vigor in the heart of every English or German regiment and, twining its tendrils about every individual in the corps, holds them together in bonds indissoluble.

But, things are changing. With every day regiments are brought more and more into garrisons by themselves. Wondrous to tell there are posts where all the ten companies bear the same number over the crossed rifles on their forage caps and where the

colors are actually saluted. By regimental order the Third Infantry never marches in review except to the stirring "six-eight" swing of the "Rifle Regiment," composed and dedicated to them by Sousa. The Seventh Cavalry never parades without "Comanche" draped in mourning, and—*mirabile dictu*, the forage "expended" in feeding the gallant old steed, who has never done a stroke of work nor carried a rider since '76, has not been stopped against somebody by a government hitherto as unalterably opposed to sentiment as Gradgrind himself. It makes one think of Andrew Jackson's response to the would-be defamers of heroic old Captain C——. "Gets drunk every day of his life, does he? Well, so he shall, if it's any comfort to him and, by the Eternal, the United States shall pay for his whiskey."

The old Fifth—the banner infantry regiment in the days when Billy Chapman, "Beau" Neill and R. B. Marcy were among its model captains, and best known since as "Miles' Mounted Infantry" in the tough Indian campaigns of the seventies, has never lost the touch of the elbow that seemed so utterly lacking in the regiments raised in '61 and then split up like so much kindling wood in '66. So, too, "the Fourth that fought at Tippecanoe" and the old Sixth. Matters indeed have changed, for at last comes a formulated scheme to foster, promote and preserve the regimental feeling that for years at least was a minus quantity.

If ever a scheme was started by the Military Service Institution of the United States that should command the respect and co-operation of every officer who has a pride in his corps and regiment, it is that embodied in General Abbot's circular of Nov. 10th.* The idea of having printed in successive numbers of the JOURNAL, historical sketches of each regiment in the Service, and of the Staff corps that have been so essential to the Army in Peace or War, is simply an inspiration.

* See copy of Circular preceding *Frontispiece.*

Reprints and Translations.

PHYSICAL CONDITION OF HORSES FOR MILITARY PURPOSES.

By GEORGE FLEMING, ESQ., C. B., LL. D., F. R. C. V. S.,

Principal Veterinary-Surgeon of the Army.

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THE subject which I have the privilege and the honor to introduce to your notice to-day, is one of much interest and importance to all who have to do with horses, whether in the Army or out of it; but more especially does it concern those who belong to the mounted portions of our forces; as upon their acquaintance with it, even to the smallest details, will, to a large degree, depend the efficiency and value of their different corps in Peace or in War. And nowhere, perhaps, could such a subject be more fittingly introduced and discussed than in this great centre of our military life, where theories can be tested and knowledge practically applied in all that pertains to the successful utilization of troops, whether mounted or dismounted. Here, at Aldershot, we have at all times, and in all seasons, a larger number of horsemen and horses than are located in any other part of the United Kingdom; and the training which they undergo, and the tests and fatigues to which they are exposed, brings them nearer to a realization of what actual warfare is, and what it demands from man and horse, than any other ordeal to which they could be subjected short of war itself.

The value of horses in land wars is so well recognized that it would be sheer waste of time to refer to it; but the value of studying their special aptitudes, their fitness for particular services, and how to obtain and maintain this fitness, is not always sufficiently considered; and when this is the case, there is danger that the advantages and benefits which should be derived from them will be only partially available or altogether lost. Whereas, with a good selection of horses for certain services, and judicious management of them, we may derive all that they can yield to man in the performance of the most onerous and severe tasks which may be imposed on them.

How horses can be best and most economically utilized in the Army, is a question which needs the most careful examination; not only because upon the results of it may depend the success of operations in the field, but also because of the increasing difficulty experienced in procuring, in a brief space, a sufficiency of horses to complete army corps, and replace the heavy

losses which are generally inevitable among them on active service. It is this question that I venture to bring before you now; and though I feel as if I owe an apology for my temerity in submitting to you views which can have nothing in the way of novelty in them, yet there may be points which will merit discussion, and differing opinions which it may prove beneficial to reconcile, so as to lead to amendment and improvement in horse management.

The physical fitness or condition of horses for military purposes depends upon several factors, the more important of which may be enumerated as:

1. Size and breed of horses for special services.
2. Food, with regard to quantity and quality.
3. Care and management.
4. Amount of work exacted.
5. Manner in which the work is exacted.

1. SIZE AND BREED OF HORSES FOR SPECIAL SERVICES.

There is not much need to insist upon the necessity for our horse supply being of the best possible quality, and well adapted in every way to the requirements of the different branches of our mounted corps. Our country is pre-eminent for its breeds of light and heavy horses, and we should, therefore, expect that our army horses would excel those of any other nation. I think it is questionable if our superiority in this respect is so marked as it ought to be, or if, with regard to at least one army, it exists at all. Perhaps our draught horses have improved somewhat, but we may entertain doubts whether the cavalry horses have gained much in size and quality during the last quarter of a century. Calling to mind the kind of horses upon which cavalry soldiers were mounted some thirty or forty years ago, one would feel inclined to express a doubt whether they are so good now as they were then. The opinion might be ventured that the modern system of racing has not proved beneficial to cavalry horses; and looking through the different regiments, and comparing the past with the present, we fancy we can see the effect of five-furlong races upon the troop horses of to-day.

Several things conspire to render these horses less suitable than in former times. Race horses were not bred for short races, but for trials of endurance as well as speed, and as it is to the race horse that we generally owe improvement or deterioration in our light horses, as he deteriorates in size and endurance, so will our cavalry remounts to a large extent. Again, before the advent of railways, in the days of stage and mail coaches, and when travellers and farmers thronged the roads on horseback, strong, good-paced animals, well adapted for cavalry, were common; now this stamp of steed is almost unknown. Therefore, it is more difficult to obtain horses physically fit for cavalry purposes now than formerly; and though, perhaps, they may show what is termed "Breeding," yet, considering what they have to do on active service, grave doubts may be entertained whether they have sufficient bulk and strength to sustain the trials which they would have to undergo.

It is possible that the steps now taken to improve the lighter breeds of

horses throughout the United Kingdom may, in the course of time, give us something like the old-fashioned cavalry horse, fit to sustain successive days of movement under a heavy load and on short rations.

If it be accepted as a fact that our cavalry remounts are, physically, not so good now as they were half, or even a quarter of a century ago, we certainly do not make amends for this by the way we treat them. Many are in the ranks doing hard work before they are five years old; and this is not conducive to their soundness or development. It would be in every way better for them if they were not compelled to undergo the fatigues of mature horses until they were five, or even six years of age, and perhaps it would be more profitable to the public. Almost every cavalry regiment has a number—some of them a large number—of horses too young for service, physically unfit, in fact; and if they were sent into the field they would probably succumb in a short time. Such regiments, though shown as up to their full establishment in horses on paper, are, therefore, not so; they are deficient in proportion to the number of young and old horses in the ranks. If it could be ordered that no horse should be considered physically fit until he had reached at least five years of age, then the casting period on account of age might be extended to eighteen years. Horses do not reach maturity—that is, the maximum of physical fitness—until they are seven or eight years old. When hard worked too soon, they are often worn out by that time; whereas, when allowed to attain their full growth and strength before they are severely tried, they might be able to perform good service up to even twenty years.

Of course, I am speaking of horses which are fairly well bred, of good conformation, in robust health, vigorous and active. It is all important that the Army should have such horses. Under-bred animals, whether for draught or saddle, though large enough, are soft in fibre and weak-hearted; they are unable to resist exposure and fatigue, and cannot be trusted on an emergency.

Associated intimately with physical fitness is "Pace." All military horses ought to be smart in movement, and of all the paces which should be found in perfection in them, walking is the one. Good walking, whether in carriage or saddle horses, should be considered as absolutely essential. Though cavalry horses should also trot and gallop well, yet quick walking is as great a desideratum in them. There is much more of this pace on service than of galloping, and it is perhaps the most trying; it is the pace which, according to an old cavalry general, "destroys more horses than do the enemy's bullets."

A horse, then, which may be considered physically fit, if of proper size and conformation for the service he is to perform, should be one which looks bright and lively, walks and trots sound and freely, has a shining coat, hard muscles, and eats, drinks and rests well.

This physical fitness we should find in greatest perfection in our fast moving horses—in cavalry and horse artillery; for it is upon them that the severest strain is imposed, as they have to move at all paces, and to cover more ground than the heavier horses, which generally move at a uniformly slow pace, and have their loads carried upon wheels. In modern warfare

the duties of cavalry will be heavier than in former days, and the brunt of the fatigue will fall upon the horses. Consequently, these horses cannot be too good. Nearly a century ago, a high authority on this branch of the Service, when insisting upon the necessity for cavalry arriving in a fit state on the field of battle, said: "A feeble, delicate horse, shaken by the constant weight it has to carry, and by bad and insufficient food, will be less certain to arrive than a powerful and robust one; or if it does reach the spot, it is exhausted at the very moment when it has need of all its strength. The rapidity of a regiment in the field depends upon the speed of its slowest horses; so that a horse should be able to go at an average gallop."

II. FOOD: QUANTITY AND QUALITY.

With regard to food in its relations to physical fitness, we all know that this should be sufficient in quantity, and good in quality; but a fact not often recognized, until too late, is that it should also be food to which horses are accustomed.

The quantity should, beyond a certain allowance, be in proportion to the amount of work performed, and perhaps also to the season. In our Army, there is a uniformity in this matter which reduces the question of feeding to the greatest simplicity, though it must be confessed that it is not in harmony with reason or experience. The forage ration is never varied all the year round, no matter how young or how old the animals are, how heavy or how light the work may be (with one or two exceptions to be presently mentioned); and large horses weighing 1,200 or 1,400 lbs. receive the same quantity as those weighing 800 lbs. This ration is, as you are aware:

If in quarters, oats 10 lbs., hay 12 lbs., straw 8 lbs.
If in encampments, oats 12 lbs., hay 12 lbs.
If employed on draught work, 2 lbs. oats extra.

The extra issue is allowed to horses of the Army Service Corps drawing wagons at a trot; and during the winter months only, for all other draught horses when employed on continuous draught work for a period of at least five hours a day.

An extra issue of 2 lbs. of oats, in addition to the ordinary ration in quarters or in encampments, is allowed to draught horses of the Army Service Corps when these are 16 hands high and upwards.

In Continental armies the allowance of forage is systematically adjusted to the size of all the horses and the nature of their work.

In the German Army, for instance, there are four scales of forage rations, the difference between them consisting chiefly in the amount of oats. There is, first, the heavy ration, which consists of 11 lbs. 7¾ ozs.; second, the ration for light cavalry of the Guard, which is 10 lbs. 15 ozs.; third, the medium ration, which is 10 lbs. 11½ ozs.; and fourth, the light ration, which is only 9 lbs. 13½ ozs.

The allowance of hay is 5 lbs. 7½ ozs., and of straw, 7 lbs. 10½ ozs.

These rations are issued as follows:

The heavy ration is allowed to horses of general officers, the general staff, adjutants, officers of the War Ministry, cuirassier and guard lancer regiments, military riding school, guard horse artillery and field officers of guard field artillery, all artillery draught horses, those of the gendarmerie and intendance and transport draught

horses. Troop horses of the Gardes du Corps Regiment receive at all times 1 lb. 1½ ozs. of oats, and 3 lbs. 4½ ozs. of hay extra.

The second scale is given to the light cavalry of the Guard, guard dragoons and guard hussars.

The medium ration is for the lancer regiments of the line.

The light ration is for all other troops and the horses of officers not specified.

The above are termed the "garrison rations," and are only drawn for horses on the strength; the three or four extra horses in each squadron, battery and company of transport have to be fed on what can be saved from the forage of the others. It is not compulsory to give the horses their full rations daily, but a portion may be reserved for times when work is heavier than usual.

On the line of march the ration is increased as follows:

Heavy ration to 13 lbs. 3½ ozs. oats.
Light Guard cavalry ration to 11 lbs. 7½ ozs. oats.
Medium ration to 11 lbs. 4½ ozs. oats.
Light ration to 10 lbs. 6½ ozs. oats.

The heavy ration of oats is accompanied by 3 lbs. 4$\frac{9}{16}$ ozs. each of hay and straw for feeding; the other rations having 3 lbs. 4 ozs. of hay, and 3 lbs. 13½ ozs. of straw for the same purpose, as litter is provided in the billets.

In the field this ration is increased all round by 8½ ozs. of oats, each horse then carrying what is called "the iron ration of oats"—nearly 14 lbs. the heavy ration, over 12 lbs, the second, 11 lbs. 13 ozs. the third, and 11 lbs. 1 oz. the light ration.

During railway transport each horse is allowed 3 lbs. 4½ ozs. of hay and 2 lbs. 3 ozs. of straw to lay on the floor and ramp of the wagon. If the journey lasts longer than eight hours, 6 lbs. 9 ozs. of hay is allowed extra for every twenty-four hours.

During army corps manœuvres and cavalry division exercises for a period of four weeks, the following rations are allowed:

For cuirassiers or horse artillery draught horses, 12 lbs. 14½ ozs. oats.

For other line cavalry regiments and horse artillery riding horses, 11 lbs. 7½ ozs. oats.

As on the march, 3 lbs 4 ozs. of hay and 3 lbs. 13½ ozs. of straw are allowed.

Three-year old remounts at the remount depots receive:

Oats, 6 lbs. 9 ozs.
Hay, 10 lbs. 15 ozs.
Straw, 13 lbs. 2 ozs.

For three or four months of the year they are put on green food, but the transition to and from this is gradual.

In the French Army there is a similar gradation in the scale of forage ration, according to the arm of the Service and the kind of work performed. The light cavalry (infantry officers' horses are included in this category) allowance per horse per diem is: oats about 8½ lbs., hay 8½ lbs., straw 5½ lbs. in garrison; on the march it is 10 lbs. oats, with the same quantity of hay and straw as in garrison; at manœuvres, if the horses are in barracks they receive the same ration of oats as in garrison, with 6½ lbs. hay and about 9 lbs. straw, but if in bivouac, then the ration is the same as for the march; while on a war footing it is 10½ lbs. oats, 6½ lbs. hay, and 4½ lbs. straw. The line cavalry (the horses of engineer and infantry officers are on this scale) receive

in garrison 10 lbs. oats, 6¾ lbs. of hay, and 9 lbs. straw; on the march 11¾ lbs. oats and 11 lbs. hay and straw; at manœuvres, if in barracks the ration is the same as in garrison; if in bivouac it is as on the line of march; while on a war footing it is nearly 11 lbs. oats, 9 lbs. hay, and 4½ lbs. straw. The reserve cavalry includes the horses of the staff, intendance, staff of artillery and of engineers, and auxiliary transport. The ration in garrison is: oats 11¼ lbs., hay 9 lbs., straw 9 lbs.; on the march it is, oats 12 lbs., hay and straw 11 lbs.; on manœuvres, if in barracks it is the same as in garrison, and if in bivouac the same as on the march; on a war footing the allowance of oats is 13 lbs., hay 9 lbs., straw 4½ lbs. For artillery horses—draught and saddle—the garrison ration is 10¾ lbs. oats, hay 9 lbs., straw 9 lbs.; on the march it is 12 lbs. oats, 11 lbs. hay, and the same of straw; on manœuvres, if in barracks it is the same as in garrison, if in bivouac, the march allowance is given; the war ration is nearly 13 lbs. oats, 9 lbs. hay, 4½ lbs. straw.

In the Russian Army the daily ration during Peace is as follows:

Guard cavalry and artillery, 12 lbs. $7\frac{8}{16}$ ozs. oats, 9 lbs. 1 oz. hay, 3 lbs. 10 ozs. straw.

Line cavalry, artillery and engineers, 9 lbs. 5½ ozs. oats, and the same hay and straw as above.

Transport draught, 7 lbs. $12\frac{1}{16}$ ozs. oats, 18 lbs. 2 ozs. hay.

In the regiments and batteries of the guard, this allowance is given all the year round, but in other corps it is only issued for eleven months, the horses being turned out to grass, and only receive 13 lbs. 9½ ozs. of hay for one month after the manœuvres.

If necessary, barley may be substituted for oats, weight for weight, and hay can replace oats in the proportion of 4 lbs. 8½ ozs. of hay for 3 lbs. 1½ ozs. oats. In War, the above rations are issued with the addition of 3 lbs. 10 ozs. of oats; and in lieu of straw 4 lbs. 8½ ozs. of hay are issued. Thus, a forage ration of the line cavalry regiment during War is 12 lbs. 15½ ozs. of oats, and 13 lbs. 9½ ozs. of hay.

From this statement you will see that in the great armies of the Continent close attention has been paid to the quantity of forage required in each arm of the Service to insure physical fitness in Peace and in War; and you will also gather that in our Army this subject has evidently not received the notice it deserves. Our horses are either underfed while they are performing hard work, or they are overfed when this is light; and if the ration is sufficient for large horses, it must be more than sufficient for small ones. I am certainly of opinion that the whole subject of forage for our troop horses needs investigation; and in view of the fact that the allowance is not properly apportioned between light and heavy horses, or with reference to the work done, and that it is generally inferior to that of other European armies, especially that of Germany. I think the time has arrived when this inquiry should be made. In this inquiry the quality of the forage should not be overlooked; the present contract weight of oats is too low, and should be altered.

III. CARE AND MANAGEMENT.

With respect to care and management, I need not say much to you, except to state that in direct proportion as these are attended to, so will the physical fitness of horses be ensured. They comprehend so many details, that it is impossible to deal with them in a brief lecture. Grooming, feeding, shoeing, housing, equipping, working, and all the other points comprised

in these terms, are of great moment, and need constant attention in order to their being carried out to the advantage of the horses. Given good horses of the proper kind, and food sufficient in quantity and good in quality, their welfare then depends upon those who attend upon them. Only one thing I would like to refer to before leaving this section, and that is the necessity for inculcating kindness in all who have to do with horses. Physical fitness is closely related to mental fitness; for that horses have minds, affections, and memories, no one can deny, and all who have studied them will bear testimony to the effects of ill-treatment, and kindness upon them, not only in the performance of their work, but upon their durability. Horses kindly treated will do as much, if not more service in a given space of time, than those which are harshly used; while they will certainly last very much longer. With unfeeling treatment and bad management, horses can be worn out in a very short period; whereas, under the opposite conditions, their lives might be most usefully prolonged to more than twenty years.

Therefore it is that, in order to assist in ensuring the physical fitness of their troopers, soldiers should be continually reminded of the great importance of kindness to their animal friends and companions. Humanity to animals is a sacred duty imposed upon all of us; to the soldier it is this and something more, for his life may depend upon the reciprocal feeling of affection existing between himself and his steed. In the words of the old cavalry soldier already quoted, "The rider must live only for his horse, which is his legs, his safety, his honor, and his reward." Soldiers should never be deprived of their horses, if possible, if they have taken care of them; but they ought to be encouraged to form a friendship with them, or even to imagine a kind of proprietorship in them. Officers and men should learn as much as they can of the care and management needed to keep their horses in the best condition for work, and how to preserve them from injury.

IV. AMOUNT OF WORK EXACTED.

The amount of work which can be safely exacted from horses depends so much upon the points I have already specified, that nothing definite can be said with regard to it. Army horses are more exposed to extremes of toil than other horses, and during active operations hardship is usually added to fatigue—hunger and thirst, exposure to inclement weather, and often more or less serious injuries being superadded. It is under these conditions that the physical fitness of horses is most seriously put to the test; and well it is if this enables them to undergo them without breaking down, or becoming seriously impaired in efficiency at a perilous crisis. It only too often happens that there is no choice, during war operations, between moderate, heavy, and excessive work, and therefore, no rules can be laid down which might be made applicable. What is comparatively easy work for horses in good condition, during favorable weather, and in a country well adapted for movement, would be the opposite for weak horses in an inclement season, and in a heavy country.

V. THE MANNER IN WHICH THE WORK IS EXACTED.

Of course, everything should be done to guard against physical unfitness, no matter how severe the duty may be; and it is here that the skill and at-

tention of officers and men are perhaps rendered most conspicuous and beneficial. In performing exactly the same amount of work under the same conditions, one regiment or battery will have its horses in a good state during the whole time, while another will be nearly broken down. This will greatly, if not altogether depend upon the manner in which the work is exacted, and the amount of care taken of the horses. It is well known that there are horsemen who will get more work out of their horses, and at less expense to them, than others; and that a horse which, with judicious management, will perform a journey of many miles, can be exhausted in a few miles by unwisely urging him. It is not always the amount of work, but the manner in which it is performed, that does the damage.

Therefore it is that, in order to keep horses physically fit for their work, the utmost vigilance, knowledge, and forethought are imperatively necessary on the part of those who are responsible; and the task is not a light one in the field. At no time was it an easy one, and during active operations in the future it is to be apprehended that it will be more onerous than ever it was it will; certainly be no less exacting than it was during the Continental wars in the early part of this century, when a light cavalry general enumerated, among other requirements of a good cavalry officer, "readiness in judging of the state of health of men and horses; a knowledge of prompt remedies applicable in certain cases; a daily and careful inspection of the saddlery, and detection of the repairs required in it; provision of everything which may be useful to man and horse, without over-weighting the latter; inspection of the equipment and of the repairs required in it; intelligent packing of kit; regularity of pace on the march; good choice of ground for camping, and continuous supervision of everything which may affect the health of the horse there; the teaching of the means by which the services of a farrier may be dispensed with for the time being; * * * watchfulness to prevent useless expenditure of the strength of his horses; to give in all circumstances a personal example, and to give it all the more steadfastly as the situations are more trying and difficult."

For horses which have to move quickly over broken ground, and perhaps at the end of a long march, the greatest consideration is required to keep them ready for all emergencies; and it is to these horses that the foregoing remarks more especially apply. While the greatest attention is being paid to render the fire of artillery and infantry more rapid and deadly, and more extended, are we taking as much care to improve the mobility, the celerity of our cavalry in proportion, so as to place it on a more equal footing with these now formidable arms? I fear the answer must be in the negative; for while our horses have certainly not improved in quality, as cavalry horses, from what they were half a century ago, when fire-arms of precision were not known, the loads carried by these horses have not been much, if anything lessened. Not only have the arms of precision rendered it necessary that physical fitness in endurance and speed should be more than ever considered in our quick moving horses; but the electric telegraph, telephone, and visual signalling, have all concurred in demanding greater rapidity of movement from them, if cavalry is to be a potent factor in warfare. In connection with this point, the question of

the weight carried by cavalry horses is of the most vital importance. There can be no doubt whatever, that for the work which cavalry should do effectively in the field, the loads they carry are far too great. So far as I can learn, the estimated weight that a light cavalry horse should carry is more than 19 stone, showing the rider to weigh 10 stone; in heavy cavalry, the soldier weighing 12 stone, the horse carries more than 21 stone, and this without even a day's forage, which will add at least another stone; and if the weather be wet, saturation will impose yet another stone or two more. Celerity under such enormous loads is impossible; and when to these we have bad weather and scanty or bad forage, with long marches, it is evident that the destruction of the best horses is a matter of a few days; exhaustion must be rapid, and sore backs and crippled limbs inevitable.

There would appear to be a tendency to heap weight on horses' backs, even in mounted corps with carriages, as in the artillery and transport.

In the cavalry, the soldier carries on him 28 lbs. 3½ ozs.; the horse equipment 74 lbs. 3½ ozs.; in wallets 6 lbs. 14¾ ozs.; in front of saddle 8 lbs. 1¾ ozs.; behind saddle 12 lbs. 13½ ozs.

In the Royal Horse Artillery, the soldier carries 28 lbs. 7½ ozs.; the horse (including harness) 98 lbs. 14½ ozs.; in wallets 8 lbs. 3¾ ozs.; in front of saddle 8 lbs. 1¾ ozs.

In Slow Draught Corps (Royal Artillery, Royal Engineers, and Army Service Corps), articles on driver weigh 18 lbs. 8 ozs.; harness complete 80 lbs. 8 ozs.; articles on saddle 26 lbs. 8 ozs.; articles in wallets 4 lbs. 8 ozs.

So that in the Royal Horse Artillery the near side horse carries 144 lbs., which, with the weight of the driver (12 stone) amounts to 22 stone, while in a field battery it is 21 stone; and these horses have to draw from 8 to 10 cwt. besides!

These terrible loads could surely be reduced, even if we must consider them as minimum—for it must be remembered there are many men in cavalry who weigh much more than 12 stone. I have seen men in light cavalry, who, in stable dress, weighed 16 and 17 stone. It does seem strange indeed, that in corps such as artillery and transport, the greater part of the killing load should not be transferred from the horses' backs to the wagons. An ounce on wheels is a pound on the saddle.

And surely the cavalry loads can be lightened considerably. Is it absolutely necessary that all the articles enumerated in the equipment list be carried on the saddle?

Wheel or pack saddle carriage should be employed to convery everything but what is vitally necessary for man and horse. It is astonishing how little is needed, if men are trained to require little. De Brack, who should have known what was necessary, says: "A valise for light cavalry which can hold more than a couple of shirts, a holdall, and under its flap a pair of boots, is not only useless, but really a danger. The fewer articles a soldier has, the greater care he takes of them, the cleaner he is, and the more ready, too. The chasseurs of the Imperial Guard went through the whole of the Russian campaign before my eyes, with a pelisse and a single pair of cloth Hungarian pantaloons." And he adds: "The art of carrying kit lies in three things—1st, to take only what is indispensable; 2d. to distribute the weight equally, fatiguing the horse as little as possible, and

not chafing him; 3d, to afford the rider the greatest possible facility in managing his horse, and to derive the greatest advantage from its powers. The art of packing is three-fourths of the duties of a cavalry soldier in the field."

The work of a cavalry horse is more like that of a hunter than any other description of horse; and we know what a hunter can do and how he must be treated in order to keep him physically fit. We also know something as to the price of a hunter able to carry 18 stone safely, and if he does two days' hunting in seven, it is usually considered enough; in the meantime, he receives such treatment in the way of housing, feeding, grooming, and other attentions, as the poor troop horse never knows at any time.

It is urgently required that the loads on army horses' backs be diminished to the very lowest possible weight. At no time should it exceed 18 stone, even with the best horses this country can produce; and that army which can muster a lightly equipped cavalry will certainly have a great advantage over one whose horses are heavier laden.

How reduction of weight is to be effected it is scarcely in my province to say, though I might urge that on the saddle and on the soldier little more should be carried than what is needed for actual conflict, and these articles should be of the very best. Everything else necessary should be carried on wheels or pack saddle.

It may be interesting to glance at the weights carried by cavalry horses in the armies of other countries, and compare them with those of our own.

FRANCE.

According to the Aide Mémoire of the Staff (edition 1888), the following are the average weights, including the weight of the rider:

Light cavalry	19 stone 1 lb.
Dragoons	20 " 2 "
Cuirassiers	23 " 10 "

It is added that these weights are increased by 1 stone 8 lbs. after exposure to rain.

A more recent article* in the *Revue de Cavalerie* (May 1881), gives the following as the result of official trials in several regiments:

Light cavalry	17 stone 11 lbs.
Dragoons	18 " 10 "
Cuirassiers	21 " 6 "

These weights were made up as follows:

	Average weight of man	Average weight of saddlery, etc.
Light cavalry	9 stone 6 lbs.	8 stone 5 lbs.
Dragoons	10 " 1 "	8 " 9 "
Cuirassiers	11 " 9 "	9 " 11 "

I may incidentally mention that the French light cavalry horses towards the earlier part of this century carried 112 to 115 kilograms, equal to 249 to 254 lbs., or 17 stone 11 lbs. to 18 stone 2 lbs.; being an average of 17 stone 12 lbs.

* Entitled "Trop Lourd."

ITALY.

Colonel Slade* gave the following as the weight of Italian cavalrymen with arms and accoutrements (forage not included):

Hussars	16 stone	8	lbs.
Lancers	17 "	4	"

This month he forwarded the following additional information:

LIGHT CAVALRY.

Average weight of man	10 stone	5½	lbs.
" " saddle complete	4 "	6½	"
" " carbine and sword		13	"
	15 "	11	"

LANCERS.

Weight of man	11 stone	4½	lbs.
" saddle complete	4 "	6½	"
" sword, lance and carbine	1 "	3½	"
	17 "	0½	"

In addition to the above the horse carries 12 lbs. of hay and 8 lbs. of corn.

Colonel Slade adds that the weights given in his report, No. 51, were taken from personal observations, as he had six men of each branch of the cavalry weighed, and struck an average. They differed a little from the above which he got from the War Office, and on one point in particular, he disagreed, viz., the difference between the individual weight of a light cavalryman and a lancer, as there is certainly not more than 7 lbs., whereas they show it to be 13 lbs.

BELGIUM.

Particulars of the new light saddle and equipment adopted for the Belgian cavalry will be found in War Office paper $^{0}\frac{140}{808}$ with enclosures.

This saddle, designed by General Courtin, when fully equipped for the field weighs:

3 stone 1 lb.

The weight of corn for the horse and the rider's rations are included.

GERMANY.

Cuirassier's horse (marching order) carries	23 stone	0.388	lbs.
Man, average	13 "	5	"
Saddlery and kit	6 "	6.002	"
Clothing and arms	3 "	3.386	"
Hussar's horse (marching order) carries	18 "	5.554	"
Man	10 "	3	"
Saddlery and kit	6 "	7.630	"
Clothing and arms	1 "	1.8924	"

NETHERLANDS.

Cavalry horse (marching order) carries	17 stone	12.8	lbs.
Man	10 "	3	"
Saddlery and kit	5 "	4.8	"
Clothing and arms	2 "	5	"

* In despatch No. 51 of 1888.

SWITZERLAND.

Cavalry horse (marching order) carries	17	stone	5.66 lbs.
Man	10	"	3 "
Saddlery and kit	5	"	0.65 "
Clothing and arms	2	"	2.61 "

SWEDEN.

Cavalry horse (marching order) carries	19	stone	8.17 lbs.
Man (say)	10	"	3 "
Saddlery and kit Clothing and arms	9	"	5.17 "

RUSSIA.

The average weight carried by the cavalry horse is 18 to 20 stone, as follows:

Saddlery complete with valise and great coat	83½ lbs.
Clothing and boots	8 "
Linen	1¾ "
Carbine, bayonet and cartridge pouch	11 "
40 rounds ammunition	3½ "
Weight of man	144½ to 180½ "

AUSTRIA.

SERVICE MARCHING ORDER.

Dragoons Uhlans	21	stone	3 lbs.
Hussars	20	"	13 "

The weight of the rider is in each case taken at 11 stone.

I have now concluded my observations on the physical condition or fitness of army horses, but feel that I can have done the subject only scant justice. It is far too extensive for one lecture, but, nevertheless, I trust what I have ventured to bring before you relating to it may be amplified by the remarks of those of you who are in a better position to deal with it than I can pretend to do.

SUMMER TRAINING OF THE RUSSIAN INFANTRY.

(From the Russian.)

BY LIEUTENANT A. T. H. NEWNHAM,

TENTH BOMBAY LIGHT INFANTRY.

(Reprinted from the Journal of the United Service Institution of India.)

THE following is a summary of an article, which appeared in the pages of the *Voyenni Sbornik*, or Russian Military Magazine.

The author commences by recalling the fact that the parades and instruction of the Russian Army up to the period of the Turkish War were entirely of a showy character, but that the experiences gained in that war convinced the Russians that as troops exist for purposes of war, they should be trained entirely with that object in view. After the Turkish War the whole system of training in the Russian Army underwent a change, and the author proceeds to point out that although the general tendency of the new system is of a practical nature, there still remain certain points which, in his opinion, require altering. We will now quote his own words:

I will commence with musketry, as being the foundation stone of the Art of War.

This, as I remarked before, was always on a good footing, moreover, the regulations for it were well worked out, and frequently improved upon. The regulations to all intents and purposes are practical, but in my opinion the question of inspections is not as it should be.

Too great an importance is attached to these inspections, as is evident from the fact that the authorities have begun to publish in detail in general orders the results of musketry inspections and the defects that have been found by inspecting officers. The inspecting officers themselves have begun to judge of the efficiency of the whole by the satisfactory condition or otherwise of the part.

Musketry has aroused a sudden enthusiasm and has thus at one bound lost its significance as a means of preparation for war, and become merely a method for giving one regiment distinction over another, in other words, officers no longer exercise themselves about its benefit as a training for war, but about obtaining a high percentage of hits at the inspection. In actual warfare, troops manœuvre and fire simultaneously—in positions strange to them, at distances which have not been measured, in all sorts of weather, and at all times. Meanwhile all our military training consists of is to fire perpetually on the everlasting range, with the knowledge that the inspection will take place there, and that too under all favorable conditions (for the first period this is as it should be); moreover, the firing is carried out to the prejudice of other duties. Every one knows that the musketry course is made half as long again, by repeating portions of the practice, especially at 300 and 700 yards, although this is expressly prohibited in the Musketry Regulations. Where is the time for this obtained from? Of course, at

the expense of those very drills which are laid down in the syllabus. It sometimes happens even that the commanding officer permits no drills, except aiming, position and firing to be carried on before the inspection, and only upon the departure of the inspecting officer are the remaining drills commenced. They are then hurried through anyhow, while guard duties, pickets, and field exercises are omitted altogether: thus tactical instructions is by preference the very one to be curtailed.

A commanding officer has to have a great deal of character to prevent such a state of things. On all sides he is told that the musketry will be ruined, and this same falling off in the shooting is a serious matter and deeply wounds the vanity, not only of a commandant, but of the whole regiment. The latter feeling has its good side too, so that there is all the more reason to regret that the thing is carried out on wrong lines, while it would be so easy to put it on the right tack. I said before that it all depends on the inspections. I take it that all these irregularities would in a short time disappear if a different style of inspection were instituted, of which the following conditions should form the basis: 1. That the inspection should under no pretense whatever be carried out on the range. 2. That it should consist of two parts: *a*, individual firing as practised at present, but with half the number of rounds; *b*, tactical instruction with ball cartridge. 3. That the inspecting officer should inspect not only the firing, but the tactical evolutions and give them their due value.

For the first, the inspecting officer should carry out his inspection, not when the regiment is brought together for its annual course of summer drills, but when the division at camp of exercise takes place. In this way the locality would not be so well known to the troops, and the plan would also have the advantage of being more economical, since the number of places to be visited by the inspecting officer would be diminished almost by a third. Besides this the inspection itself not being carried out immediately upon the completion of the course would cease to be regarded in the light of a lesson, which had to be repeated and then put aside. Troops should always be able to fire well, and not only when the impressions left by a course just completed remain fresh. It goes without saying that under such conditions percentages should be entirely abolished as a means of judging merit.

As regards the second heading, the inspection of individual firing should be carried out as at present, omitting volley firing. For the individual firing sections might be called out instead of half companies, as being quite sufficient to give an idea of the efficiency which each company has attained in musketry training. In addition to this the composition of the section, if selected by the inspecting officer, will be of a more practical nature, as in every section there will be good shots and indifferent shots. Next, it will be necessary to form out of the regiment a battalion on a war footing, for which the inspecting officer himself will pick out the officers and men, but in no case should there be more than two company officers to each company, since in war there would never be more than this number.

The inspecting officer then gives out the general idea for the attack, and the targets being exposed accordingly, the practice begins, during the pro-

gress of which the inspecting officer or the commandant of the regiment* only interfere, when the officer commanding the troops or any part of the troops transgress their proper limits. Volley firing will be inspected during the movement, and not at the time of individual firing. The rounds for this will come out of the difference obtained by taking out sections instead of half companies during inspection of individual firing.

As regards the third, every inspecting officer without doubt is competent to judge of the tactical training, and to do this he should carefully note whether the movements are conducted in accordance with sound principles, whether the formations are regular and whether an ability to utilize the advantages of the ground is displayed, and in general so draw up his report on the tactical and musketry training of the regiment as to give no undue prominence to one over the other. In this way musketry will lose its one-sided character and go hand in hand with tactics, the general result being the much sought after preparation for actual warfare.

The consequence of all this on the musketry training will be to give it a more practical character. In my opinion it should be divided into two parts or periods.

The first of which in winter and spring will be strictly according to the letter of the regulations, all musketry of a show nature being omitted, to save time and avoid needless expenditure of ammunition. To effect this only one distance will be taken, from 400—600 yards inclusive, so that one regiment will fire at 400, another at 500, and so on, but so arranged that no regiment shall fire at the same distance two consecutive years. The volley firing should be removed into the second period.

In this latter period will be individual firing and afterwards field firing, which will be carried out by the two battalions in turn, every officer and man being present.

As regards the "Instructions for Field Firing in connection with Manœuvres, the three arms being employed," I see a great step forward in the right direction, and I would only observe that it would be desirable to give equal weight to the importance of the tactical and musketry elements, or even the supremacy of the former over the latter. Tactics decide the question of success in war, whilst musketry is only a means to that end.

I think, moreover, that the question of the duration of time, for which firing should be kept up on the targets, or dummies, should be left entirely in the hands of the officer commanding the movement, without hampering him with a strict adherence to the regulations, otherwise it may happen that one portion of the troops may have finished their rounds and remain inactive, whilst another is continuing to fire, which of course would never occur in actual warfare.

I will now pass on to the other points, also important, but comparatively less so, namely drill and tactical formations. As all know the former precedes the latter, and forms an indispensable stepping stone to it. In this department we have a whole library of books containing instructions and information of all kinds, but none the less it is impossible to pass it by

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*A Russian regiment is composed of two battalions.

XUM

without mentioning the excessive length of words of command used in carrying out an attack, and pointing out the enormous gap between tactical formations and manœuvres between opposing forces. I will enter a little more into detail concerning this gap, since it deserves a fuller attention. To all appearances our present system of formation approaches that of Frederick, *i. e.*, line formation, with this difference that instead of a locked formation it is open; in spirit, however, we continue to uphold the perpendicular formation of Napoleon, as we preserve touch from front to rear.

The characteristics of modern warfare are the difficulty of directing large masses and the increased importance of the part played by junior officers. All this it is necessary to bear in mind in carrying out instructions in manœuvring.

Our soldiers are possessed of boundless courage, and our officers imbued with a lofty spirit of self-denial, in which respect they excel those of all other armies. It is this fact alone which has more than once extricated us from a position where any other nation would have come to grief. But this is not all that is wanted. The ability to make a rapid decision and one which meets the demands of the occasion, the gift of never under any circumstances getting into confusion, these are also invaluable qualities. How are they to be attained? In war men do what they know: they know what they have learned. Meanwhile our training is carried on in the most routine manner, although it must be confessed great progress has been made in this respect compared with what used to exist before the Turkish War.

In our attack drills everything is carried out according to a cut and dried plan, every company in correct order without any commingling of various detachments. This state of things would be very desirable in war, but unfortunately it often happens that something quite the reverse takes place, and troops accustomed to act only in conformity with a well-known plan unavoidably lose their heads as soon as they are confronted with disorder. It is only after some experience, and dearly bought experience, that they learn how to extricate themselves with credit. Let us look now how an attacking force advances into action. First it gets into fighting order from the line of march, outside the zone of fire; arriving within it, losses in the ranks immediately commence, at first slight, but increasing in proportion as the enemy are neared, and reaching their climax during the advance for the final attack. The reserves, which are behind, come up in succession, and get gradually absorbed into the fighting line, and unavoidably mixed up with it. The officers should quickly divide the commands among themselves, although very often under their command they may find not only different companies of their regiment, but parts of different regiments. The subordinate officers should be taught to quickly restore order, especially after the attack is finished, and to form up the men without delay under the command of the nearest officer, without rearranging them into their respective companies, and order them to take their commands from that officer.

Now how can all this be taught in peace time? Very simply. It is necessary only to practice losses on every attack parade, in proportion to

the strength of the position occupied by the enemy. This can be done by declaring certain men as out of action, at first in small numbers, afterwards in greater, in proportion as the distance from the enemy decreases, and most of all during the final attack, at the same time paying strict attention that the men rapidly close up. Under these circumstances reinforcements can be carried out without fear of creating a solid locked line, and also a certain amount of mixing up involuntarily takes place. With all this one must not forget that a detachment which has been told off to effect a certain object, must not be taken out of action until it shall have performed that object, and only in the event of utter exhaustion or the clear impossibility of effecting its end should it be transferred to the reserve.

The above mentioned practice of imaginary losses is useful for the following reasons: 1st. It accustoms the soldier to the idea that losses are inseparable from fighting, so that when he meets them in reality he will be less affected by them, although this feeling can never be entirely got over. Only those who have been in action know how the sight of the first killed and wounded acts on the nerves. 2d. It is good practice for the medical officers and hospital assistants.

These imaginary losses too must be carried out in the case of officers, with the exception of the officer commanding the detachment and the officer superintending the manœuvres. In this way junior officer will learn quickly to take the place of their seniors and fulfill their duties.

Regarding tactical instructions and manœuvres I would add that it is absolutely necessary to take care that the scouts conscientiously carry out their duties. In the majority of instances the work is performed quite mechanically. There would be no harm in the general officers deputing their staff officers to find out whether the scouts had a proper knowledge of their duties. Further, I would suggest, that in manœuvres carried out by small bodies of troops it would be a good thing to practice the attack and defense of certain features of ground, especially fortresses, according to the method laid down in Dragomireff's work.

Guard, and outpost practices are generally speaking established on a sound basis, but since no inspections take place in this most important branch of modern warfare, it stands a very good chance of being ruined, thanks to the innate carelessness of the Russian character. For this reason some sort of supervision is absolutely necessary, and this is easily insured. For instance, the general commanding a division might send his senior staff officer on the night appointed for picket duties to inspect the manner in which they are carried out, but he should in no case interfere. Every man employed on outpost duty should be able to give the desired information to all questions which are put to him by the staff officer, and the latter will then report all he has seen to the general commanding the division, and he, should circumstances require it, will demand personal explanations from the officer commanding the regiment. For regiments which are stationed where there is not a divisional staff, some such supervision is absolutely necessary.

In spite of the present fad for engineering, we have not yet reached the stage of being entirely carried away by it, and consequently the matter is

treated with common sense. The chief point is intrenching with the small spade, and especially under the enemy's fire. As far as I have observed this important matter is everywhere more or less well managed. The "Instructions" for it are excellently drawn up and the explanations clear and simple. The "Regulations for Instruction of Sapper Companies in the Infantry," are a little more intricate.

In my opinion the seconding of officers and subordinate ranks in sapper brigades is most useful, but the number of the latter should be reduced by half, so that fewer men should be taken away from their proper duties. The instruction of the subordinate ranks, however, in such an extensive programme as is laid down in the above mentioned regulations I cannot but think is both difficult and useless. Difficult, because the time allowed is not sufficient, and useless because the officers, even when they have gone through their course, can never replace engineer officers pure and simple, and secondly, because whenever any important fortifications or lines of communication have to be constructed an engineer officer with a company of sappers is always applied for. Besides which it is hard to ask an infantry soldier to carry out a purely engineering work. Moreover, during the course he forgets his own duties, and does not thoroughly acquire the new. For this reason I take it the "Regulations for Instruction of Sapper Companies in the Infantry" should be considerably simplified throughout all its parts, and more especially as regards fortifications and lines of communication.

It would be desirable to practice drill as often as possible with companies of war strength and also carry out manœuvres with opposing forces in the same way, although there is no provision for the latter in the syllabus of annual training. In this way the eye would get accustomed to judge distances accurately for taking up positions, etc., which with the present companies of half strength or even less cannot be practised.

Manœuvres on a large scale are carried out in a sensible manner; the commanders of opposing forces are granted full liberty of action, the troops are quartered for the night with a due regard to the progress of the manœuvres, and due attention has been paid to the working of the transport, our weak point. And yet much remains to be done as to preserving mutual relations between the various arms and the support which they should infallibly give each other.

These manœuvres, unfortunately, are very expensive and so cannot be carried out as often as one could wish. And yet it is a practice which is exceedingly useful for commanding officers and officers of the general staff, and also for developing enterprise amongst the cavalry, which thus has a wide field for operations thrown open to it.

During the last two or three years the authorities have begun to practice manœuvres in which fortresses play a part. The advantage of this is evident, but the plan is as yet new and not regularly established.

Would that it were so.

LETTERS ON ARTILLERY.

By PRINCE KRAFT ZU HOHENLOHE INGELFINGEN.

Translated by Major W. L. Haskin, U. S. A.

IX.

UPON THE METHOD OF RENEWING THE SUPPLY OF AMMUNITION IN THE FIELD.

I AM about to take up a subject which I fear will tire you beyond measure.

I propose to examine the reasons why our artillery suffered in 1866 for the want of ammunition, and the course which was followed in 1870 to cure this evil. I cannot avoid this tiresome subject.

It is certainly of the most supreme importance that the supply of ammunition should be renewed at the moment when it is needed, for what can an artillery line effect in an engagement if its ammunition is exhausted? One could hardly say as the brave Saxon general said to the battalion of *chasseurs à pied* which had exhausted its ammunition at Sedan: "Well, you still have cutlasses." He spoke thus, but he also remained near the battalion in the line most advanced, until a supply of ammunition was received.

This is why the artillery must devote as much zeal to the renewal of its ammunition as to making the proper use of that which it has. It is certainly the fact that many staff officers, after having elaborated the details of the operations against the enemy, feel a strong sense of impatience and *ennui* when it becomes necessary to dispose also of the tremendous columns of ammunition trains which hang like lead upon the heels of the army. From more than one of them will be heard the cry: "Ah! if you speak of the ammunition trains I shall be distracted." Nevertheless the trains must be provided for.

I agree that only to think of those immense columns of wagons which with incredible slowness dragged themselves behind the army and covered all the roads (in 1870 each army corps had nine columns of 27 wagons each, each wagon occupying a length of 20 paces); only to think of this, I say, totally annihilates the poetic—almost chivalric—idea that the young soldier, devoured with the desire to do gallant deeds, has of the pleasures of glorious war. I was not at all surprised that a young officer of reserve of the cavalry of the Guard, cadet of a noble family, who was attached to the artillery and who asked to be assigned to a horse battery, that this young man, I say, almost fainted with disgust when I had to tell him that he would be employed with the ammunition trains. But later he learned to look more favorably upon the duty which had fallen to his lot, for he found occasion to become engaged so far to the front that his horse was wounded in a fusillade—he found occasion to distinguish himself to such an extent in the first battle that his conduct brought him the iron cross.

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The improvements in fire-arms have caused a considerable change in the manner of viewing the glory, honor, and chivalric conduct which in antiquity and in the Middle Ages alone made the law, and which were founded upon the skill with which one could fight with the sword, the axe, the lance and the mace. For in order to triumph over an Achilles before the walls of Troy, as over an Albert-Achilles of giant strength, there suffices now the same little projectile of nine millimetres calibre thrown by an arm of precision with which we lay low the weakest soldier.

Individual combat has a very small space in the action of the modern soldier. The infantryman is hidden in the rifle pit or behind a fence; he loads, aims and fires the piece which sends the projectile. The artillery fighting is even less personal. One man orders the details of the pointing and the kind of fire, another sponges, a third brings up the shell, a fourth places the fuze, a fifth sights, and the last pulls the lanyard; and nevertheless they are as truly fighting as was the cavalier who, sword in hand, went to the fight after the manner of the ancient knights. Now, honor and chivalric valor consist in fulfilling with precision, fidelity and calmness the duty which one is called upon to perform in defiance of the constant danger which surrounds one. This is why he who brings ammunition into the line of battle participates therein fully as much as he who expends the ammunition. What difference is there between the cannoneers who carry the shell from the caissons to the pieces and those who bring the caissons filled with cartridges up to the battery in action? You must agree that the work of replenishing the empty ammunition chests is certainly a very important part of the battle—of fully as much importance as the firing, the attack, or the taking of tactical positions in anticipation of the struggle, and hence you must force yourself to overcome the sentiment of *ennui* which involuntarily is felt when the subject is discussed, because of the number of very great difficulties which must be overcome.

I have no data concerning the special arrangements which were made in the wars at the beginning of this century to assure the regular renewal of the supply of ammunition by the armies then in the field. But it seems probable to me that the renewal was rarely necessary in the course of any single battle (with the exception, perhaps, of the battle of Dennewitz, during which Von Bulow sent to General Tauenzien an ammunition train), at least this necessity was not felt by the batteries which came upon the field of battle with a full supply. The regulations in this regard which have remained in force in our Army up to 1866 would seem to indicate this. But after the battle there was plenty of time and all the leisure needed to bring up a new supply, and the more so as the combats and battles did not succeed each other with such short intervals as in our last wars.

For even at the time when Napoleon I. conducted campaigns with the greatest energy, we do not find so rapid a succession of violent engagements as during the eight days campaign from the 26th of June to the 3d of July, 1866, in Bohemia; and the War of Liberation, which lasted three years, did not count as many as the War of 1870–71, which lasted six months. Add that with the breech-loading pieces, it will certainly occur that in critical moments a much greater expenditure of ammunition will be made than

with muzzle-loaders, which take so much more time to load; and also that, the battle once decided upon, masses of artillery are now required to open the action much earlier, and are no longer held inactive in reserve. Armies are now larger, and on that account also the expenditure of ammunition is greater, and it is necessary to renew the supply more frequently. For the same reason the roads, more than in the past, are covered with great masses of troops and the ammunition trains which follow them have to struggle with a greater number of difficulties and obstacles.

At the beginning of the century it seemed to satisfy all the requirements to cause a certain number of ammunition trains to follow, and to add caissons to the batteries. It does not appear that a special service, marching with the precision of mechanism, was organized.

At least when, in 1866, the Inspector-General of Artillery asked the advice of two veterans of the War of 1813 who were no longer on the active list, in regard to whom he should put in charge of the duty of bringing up the caissons, one of them replied that he would not assign the duty to the staff-sergeant for his, in 1813, was such a coward that in every engagement he saw a battle lost and ran away with all his wagons. The other replied, also, that he would not place that duty upon the staff-sergeant for his "was so brave a man that he could not do without him in the battery when it had opened fire."

If the regulations concerning the renewal of the supply of ammunition which were in force with us up to 1866 were based upon the experience acquired in the wars of 1813–15, one would be tempted to believe that no battery in those times ever exhausted in one day all the ammunition which it had in its caissons and limber chests, for these regulations went no further than the replenishment of the limber chests of the pieces from the caissons. As to refilling these last, the regulations contained but the single rule: In his report of the battle the captain commanding the battery shall furnish a list of ammunition expended, and will make requisition for a new supply. He will then receive an order indicating where the requisition will be filled. This requisition was forwarded through the regular channels to the general or other superior officer who commanded both the battery and the train.

It is perhaps the minute control that was practised in all the branches of our military and civil service, and which, without doubt, from a general point of view, has been the principal cause of our having such perfect public servants; it is perhaps this control, I say, which with time has contributed to create in the branch of the service of which we are speaking, this overscrupulous and red-tape spirit which, when the service was for the first time called into action in the field in 1866, necessarily produced considerable and even irreparable delays.

It was required in this campaign that the batteries and ammunition trains should furnish at regular intervals reports, made out upon an imposing model, of the amount of ammunition on hand. These reports were verified by the corps chief of artillery, and the issues and receipts should balance. According to the supply on hand, as shown by these reports, the corps chief of artillery made requisition on the Chief of Artillery of the

Army for any deficiency, and he gave an order upon the depot of field ammunition from which the trains were to obtain the amount required.

Besides this, after each engagement every battery commander was required to furnish, with his report upon the battle, an extra statement showing the ammunition on hand, and in accordance with this report received an order upon the ammunition train for the renewal of the amount expended.

Although the amount of clerical work thus made necessary was much reduced by the printed forms furnished the troops before their departure from garrison, you will nevertheless agree that, reduced as they were, they not only inconvenienced the battery considerably after an engagement, but that it was impossible to finish them at a time when the battle had lasted till nightfall, and the battery had to pass the night in bivouac wherever it happened to be, in the rain and mud, so as to be able to continue the march at daybreak. For this report upon the battle should be accompanied by a sketch, with a list of losses, and a list of the names of those recommended for decorations. It happened sometimes that several days elapsed before the general commanding the corps artillery was able, by the receipt of these reports, to make requisition for the needed ammunition, and during all this time the batteries were waiting for it.

This matter took even more time with the chief of the reserve artillery of the First Army in 1866, for it was necessary that the requisition should reach the general commanding the artillery of the whole army, because there was no special commander for the III. and IV. Corps, and it is there that the order was issued upon the general commanding the reserve artillery of the First Army under whose orders were placed the two battalions of the ammunition train.

The number of caissons and wagons of this great artillery reserve marching behind the army was enormous, and in consequence, the distances that it was necessary to traverse to reach them were so considerable that the orders for the replacement were executed very slowly. Consider that this artillery reserve with its fifteen batteries and two battalions of ammunition trains covered, when in march, a length of 27 miles. This length of column also rendered the transmisssion, at the proper time, of the orders governing its march a matter of great difficulty.

It could easily happen that a battery had not been able to renew its ammunition four days after an engagement, because the ammunition train had not received the order necessary for its issue. Hence, when the battery entered a new engagement with perhaps four empty caissons it very soon exhausted the remainder, and nevertheless no one could be blamed. The very impractical character of the regulations, concerning the manner in which the battery caissons should be disposed of, made equally doubtful the renewal at the opportune moment of the ammunition in the limber-chests of the pieces. These rules required that the caissons of a battery should be divided into two groups, of which the first, consisting of two or three caissons and a repair wagon, should follow the battery at a distance of 300 or 400 paces; while the second, including the rest of the caissons, should remain out of range of the enemy—that is, at least 1,000 paces in rear. It

was very difficult to conform to this regulation when a battery acted alone for the chiefs of the groups—who were non-commissioned officers, or even private soldiers—could not, when a sudden change of position was made, receive the necessary orders in time. Besides that it was not always possible to find in the ranks men with the necessary address and intelligence. Therefore when the battery retreated it could be seen often that the groups of caissons barred the road, or closed the defile, or, finally, found themselves nearer the enemy than the batteries themselves.

You can easily see how these difficulties would increase, how they might even constitute obstacles which it would be impossible to overcome. as for instance, when many batteries advanced upon a single road to occupy a new position, or when still other troops came up on the same road to enter the struggle. The unhappy private soldier who commanded one of these groups would find himself with his three or four vehicles considered by the regiment of infantry or cavalry to which he barred the way as a fraction of a train which was out of place, that is, he would be thrown into the ditch.

Figure to yourself an army corps whose batteries are all in action. Behind them, at a distance of 300 or 400 paces, are posted as many little groups of three or four wagons each as there are batteries; conformably to the regulations they seek sorrowfully and vainly "to shelter themselves behind whatever cover the ground affords." At a thousand paces at least behind them are posted other groups of equal number, each containing seven or eight carriages, who have instructions to avoid entering the zone covered by the enemy's fire. Suppose the least crisis in the battle and necessarily the most horrible disorder will ensue. I do not know if the thing really happened, but if the regulations then in force were observed and the second groups of caissons belonging to those of the batteries, which in the combat of Nachod, made with the whole of the advanced guard a retrograde movement, had been obliged to hasten out of the zone of fire in retreating and to precipitate themselves head-first into the defile of Nachod they would have met there the bulk of the army corps and might have checked its advance. If this did not happen it was because the chiefs of those groups disobeyed the regulations.

I have my reasons for believing that these regulations, so unnatural, concerning the manner of conducting the caissons, rules which were yet in force in 1866, were not formulated during the War of 1813, but that they were formulated long after that time, with the best intentions in the world, by aides-de-camp who never saw active service. The general who approved them doubtless attached very little importance to them, because in the War of 1813–15 there was probably no failure of ammunition in the battles, and after the battles there was always plenty of time to refill. A few words spoken, when I passed my examination for the grade of captain, by the chief of the regiment to which I belonged, Colonel Von Rohl, makes me believe this. He was one of the veterans of the War of Liberation and was decorated with the iron cross. When he was in very good humor and among friends he spoke the purest *Berlinois*. I had told him during my examination what the regulations were with regard to renewing the supply of am-

munition. He said that my replies were perfectly satisfactory and in agreement with the regulations. "But," he added, "don't you know that that is all nonsense? In the field no one pays any attention to the regulations. Two *échelons!* Nonsense! In the field we march with all our carriages, and when the enemy begins to fire we say 'Caissons to the right; there in that field,' then we go to the front and fire. Then we send some one after them when we want them." I expressed my regret to the colonel that I had been obliged to learn what might be termed "nonsense," and asked him how I could find out what was worth learning. "My dear boys," he said, "Do not study so much. It only makes you stupid." You see he could not be classed among the "scientific" artillerists.

The ancient regulations which we are discussing also stated that it was necessary to proceed to the replacement of exhausted ammunition (with the exception of canister, which should be replaced immediately) as soon as there was a cessation in the firing or in the general battle. "You will proceed, at the latest," continues the regulations, "to the renewal of ammunition when you have expended half of the ammunition contained in the limber-chests of the piece,"—that is, it was not required to renew the supply during an engagement except in this case. But with rifled pieces it was found that at that moment it was already too late. These pieces could be loaded much more quickly than the smooth-bores, and could in a very short time, if rapid fire were ordered, expend this second half before the order for the renewal could have been executed.

As to what a battalion commander should do with his caissons, when he was required to bring into action under his own command all four of his batteries, the regulations were absolutely silent, and nevertheless we saw during the period of battalion manœuvres, almost every day, entire battalions making evolutions together, which evolutions would not be possible if, at 400 paces behind each battery, three or four caissons marched. What, for example, would become of these groups of carriages if the commands were given: "Platoons. Right wheel. March—Column left. March"?

When we heard the alarm in the bivouac of Rettendorf very early in the morning of the 3d of July, 1866, I was sent to Königinhof to the railroad depot to receive orders, and immediately went there. At the moment of starting the chief of the second battalion, Major Von Miesitschek, asked me to authorize him to take in his battalion with all the pieces in the lead and the caissons following. "Unless I can do this," he said, "I cannot command the battalion as a whole and lead it against the enemy." I was in a hurry, and in leaving him, said: "All right. Do as you please." I had occasion to regret this extremely, for what happened? The order given at Königinhof by the general commanding the Guard Corps was to the effect that the reserve artillery marching behind the first division of infantry of the Guard should cross the Elbe at Königinhof, and that the second infantry division should follow it. After having conducted the head of the reserve artillery into Königinhof,—after having begged the general commanding the second division of the Guard to give it the road,—I had gone to the front by way of Chotieborek to view the situation, The second division of the Guard allowed the batteries to pass and enter the defile, but when it saw behind the bat-

teries a column of caissons that they took (there were forty of them) for the ammunition train, anxious to be taking part in the action and in no way desirous of coming upon the enemy after the "train," the division began its march and directed the caissons to give way, since there was a general order to the effect that until further instructions the ammunition trains should not cross the Elbe. This is why it came to pass that during all that battle the caissons of the batteries of the reserve, having crossed the Elbe after the last man of the corps, ran from right to left seeking over the whole field of battle their batteries, which they found only after the battle was wholly over.

If I had had them at my disposition sooner—if Von Miesitschek had obeyed the regulation which prescribes that for forced marches a caisson should follow each piece—I would have had at Chlum at half-past four o'clock my full supply of ammunition, and would have been prepared to stop the enemy's forward movement without needing assistance, for General Von Dresky is right when he says: "Attacked in front an artillery line cannot be broken," that is, if it has ammunition. But we were without it, and were not then in a state to hold our position. Many of the batteries had only a few cartridges. I therefore followed our infantry, which was pressed very closely by the enemy in superior numbers, and which retreated to the height upon which the northern extremity of Chlum is situated, after which the Prussian I. and VI. Corps came to the front and checked the enemy's advance.

One thing was by this firmly impressed upon my mind: "Never permit all the caissons to be separated from their batteries."

If, further, you consider the fact that the regulations, in regard to the mode of renewing ammunition, are insufficient in that there is no article therein formally prescribing that a battery having no more ammunition is not the less obliged to retain its position in the line; you will find it very natural that the batteries which had exhausted their ammunition and were without defense should prefer to retire to the rear rather than to see their pieces fall into the hands of the enemy.

You desire to know upon what principles, as opposed to those in force in 1866, we proceeded in the War of 1870–71, in the renewal of exhausted ammunition.

I will describe to you the mode observed in the Guard Corps, but I do not know whether the same routine was followed in all the other corps. The inspector general of artillery had amended the rules which had been reeognized as insufficient in 1866, and the new directions gave the greatest liberty of action in all the details of the service. I do not recall exactly which were the formally prescribed measures, and which were those which originated in the liberty left to the troops.

I will begin with the manner in which the batteries received their ammunition during an engagement.

During the march the batteries never took any other formation than that prescribed for forced marches. Behind each piece came a caisson, which was under the control of the chief of piece. Behind the battery came the repair wagons, field forge, and baggage wagons (all the wagons of

the administration service), under the quartermaster or sergeant of equipment. No other formation was ever made use of than column of section, or the battery in line. Even in this last formation the caissons followed the pieces, and in a third line came the four carriages of the administration service. When the battery was to go into action the order was given: "Form Echelons." At the moment when the battery came within range of the enemy's projectiles the pieces went forward. They were followed immediately by the first echelon of carriages (three carriages and a repair wagon). The second echelons of the batteries (there were still six carriages per battery), of the whole battalion united, under the command of an officer, were posted upon a point which the battalion commander was required to designate. When the battery came into action the carriages of the first echelon posted themselves on the left of the pieces upon the same front and with the same intervals. The battalion did not go into position under the single command of the battalion chief (the single exception being the evolution made by the Second Battalion at Sedan, already mentioned, to pass from its first to its second position), but the batteries went to the front, as they successively quitted the formation in column, in obedience to orders given by the battalion commander. These orders were the simplest possible. He, himself, directed the first battery and sent orders to the others to post themselves on the left or on the right of the first one. When the ground was open and there was no motive for acting otherwise, each of the succeeding batteries posted itself 200 or 300 paces nearer the enemy than the one which preceded it into action. This proceeding was the idea of Scherbening. He had employed it in 1866, at Blumenau, with success. By it the enemy, when on the defensive, is deceived. He will get the range of the first battery, and not reaching the succeeding ones with the same elevation will be obliged to get the range for them anew. Once solidly established it will be necessary to bring the batteries in rear into line with those in front in order that they may have a full sweep over the whole field of fire. This measure must be taken also because of the moral effect upon the men, for it does not produce a good effect to leave some batteries at a greater distance from the enemy than others.

Of course Scherbening's method can only be employed when first entering the field of action, and provided the ground is absolutely open, showing no undulations, as was the case at St. Privat.

At Sedan the crests of the heights ran between the valleys with banks sharply defined, imposing positions upon the artillery in a clearly defined manner, and here it was impossible to advance with the difference in the distances of 200 or 300 paces.

But I have allowed myself to make a digression. Let us return to the subject of the supply of ammunition.

The principle had been established that it was necessary *to expend first the ammunition in the caissons, and to preserve carefully the ammunition in the limber chests of the pieces as a last reserve.*

While it was possible to fire slowly it was required that each shell should be taken directly from the caisson, and to effect this one caisson was placed behind the second piece and one behind the fifth. It was only allowed to

take from the limber of the piece the first shell upon coming into action while the caissons were not yet in place; and to use the supply in the limber chest when the order for opening a rapid fire was received. But as soon as the critical moment had passed it was required to fill the limber chest of the piece at once with ammunition from the caissons. The men who were seated on the caissons gave their assistance in doing this. As soon as one of the caissons was empty the wounded were seated upon it and the dead placed there (for it is best to keep the men of the battery from seeing their dead comrades as much as possible) and it was driven slowly toward the position of the second echelons of the battalion. The third caisson of the first echelon took the place of the one sent to the rear and at the same time a new caisson of the second echelon came up at the most rapid gait possible to place itself upon the wing of the battery which was in action. The second echelons of the battalion sent the empty caissons which came to them towards the ammunition train as soon as the train had reached its designated position to be there refilled.

When in the course of the battles of St. Privat and of Sedan I traversed the line of batteries and inspected the limber chests of the pieces I found them filled to the brim. And when at St. Privat we advanced with the assaulting infantry and the batteries reached the height between St. Privat and Amanvillers which had just been taken, and then the position nearest the enemy close to and in front of St. Privat, the batteries came up always with the limber chests of the pieces filled. We very soon had occasion to see how necessary this was. Beginning at this moment rapid fire was opened many times and it was no longer possible to draw ammunition directly from the caissons. But as soon as the necessity for the rapid fire ceased the limber chests of the pieces were immediately filled from the caissons.

It is by proceeding in this way that, in spite of the enormous quantity of ammunition expended during the battle, we reached the evening without being embarrassed, except late in the evening in the case of those batteries of heavy calibre which had been in action longest, for the batteries of heavy calibre had less ammunition than those of light calibre. They expended the last shell in the last caisson and all that there was in their limber chests, for on this day the fifteen batteries of the Guard fired from 8,000 to 9,000 shells. But the ammunition train succeeded in removing this embarrassment, as I shall describe to you later.

Posting the carriages of the first echelon upon the same front with the battery presents, it is true, this inconvenience, that the battery requires for its front an extent of 200 paces, while that without it 120 paces will suffice. This measure can only be resorted to, therefore, when the necessary space can be obtained, as was the case with us at St. Privat, while at Sedan we had no emplacements of sufficient extent. But in all other respects this measure offers only advantages. Thanks to the more extended front the enemy is more enveloped by our fire. The distance of almost 100 paces which separates the piece on the left wing from that on the right permits the observation with great facility of the effect of the firing,—of correcting

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the range more easily, —and of giving more room for the men furnished by the infantry to protect the batteries.

You will perhaps say that carriages so placed will be more exposed to loss than if stationed 300 or 400 paces in rear, but with rifled cannon the ground behind the pieces for a distance of 300 or 400 paces constitutes, because of the bursting shell, a field more dangerous than a position upon the left of the pieces upon the same line. The enemy's pieces fire upon the pieces of the battery and not upon the caissons on their flank and their practice is usually sufficiently good to render these caissons tolerably safe.

It has been proved that the carriages placed upon the same front alongside the batteries were less exposed than if they were posted in rear. During all the battle of St. Privat none of the caissons were blown up although I had limber chests exploded.

I have cited particularly the battle of St. Privat because we expended there the greatest amount of ammunition. At Sedan the fifteen batteries of the Guard fired about 5,000 shell. At no time during this last battle was it necessary to have recourse to the ammunition train to fill up the caissons.

Let us pass now to the method employed in refilling from the train, and in replenishing the train from the field depots.

The nine ammunition trains which followed each army corps were divided into two echelons of which the first, which included two infantry and one artillery trains (after St. Privat the opposite proportion was established), followed the army corps at the distance of half a day's march. The other echelon, which contained the six remaining trains, followed at a full day's distance. The chief of all the trains,—of the battalion of trains,—marched with the first echelon, and the daily orders by which his march was directed were transmitted to him by the corps chief of artillery, who received them from the general commanding the corps.

The distance at which the two echelons marched rendered the transmission of orders very difficult. It is perfectly clear that it was very difficult for the corps commander, who had to decide upon his course and formulate his orders in the evening, after the receipt of the reports upon the enemy's movements, to send in the course of the same night the orders concerning the next day's march of the trains so as to reach them in time, they being distant (including the depth of the column of march of the corps) from 23 to 28 miles. It is hardly possible that aides-de-camp or orderlies should traverse, in the night, distances of 23 to 28 miles and rejoin headquarters which will have perhaps advanced 14 miles in the interval. Success in regularly directing the march of the ammunition trains was not met with until the establishment of relays of couriers between the headquarters of the corps, that of the chief of the corps artillery, and that of the chief of the ammunition, extending finally as far as the second echelon of the trains. These couriers were changed daily and this line was sufficient for the regular transmission of orders, but the trains had to struggle without ceasing against difficulties of every nature, and to vanquish very great obstacles, for, in the rear of an army corps the road is required not only for the ammunition train, but for the bridge train, ambulances, etc., etc., to

such a degree that it is almost blocked. In the extraordinary case when an advance in view of a battle was made the aides-de-camp who were sent with orders evidently had very great distances to traverse.

Care was taken to impress upon the chiefs of the ammunition trains the obligation to make all the efforts humanly possibly in order not to leave the troops who were engaged without ammunition. They should, in case of battle, march upon their own responsibility and without awaiting orders.

As to the chief of the trains, his instructions were to report immediately, as soon as he heard or understood that a battle was about to take place, without awaiting any order, to the general commanding the artillery of the corps and to demand of him, as soon as he found him, orders concerning the point at which he should post his trains. The order indicating this point was communicated to the infantry divisions and to the artillery of the corps during the battle, so that they might know where they could get their empty caissons filled.

But it became absolutely impossible to give regular direction to the ammunition trains when several corps followed each other on the same road, and when each of the corps with its troops alone occupied a depth of 14 miles. In such a case it was absolutely necessary that the chief of the trains should execute his task, even though it should require superhuman effort, and should attempt to follow his batteries and do his utmost to rejoin them as quickly as possible, and to do this that he should act upon his own responsibility without awaiting the receipt of the special orders of the day. Let me tell you how these brave officers comprehended and fulfilled their duties.

At the moment when our armies in 1870 were concentrated in the West the railroads were so put under contribution by the troops of the fighting line that it was found to be impossible at first to send with each army corps more than three ammunition trains, or the first echelon. The dispositions for the transportation of troops were made by the railway section of the general staff at Berlin, and the generals commanding the troops had nothing to do with them, and were not informed of the several movements, because they were liable to undergo modifications to accord with the enemy's movements which it was absolutely impossible to foresee. It was only when the troops rejoined their chiefs that they could dispose of them.

We (the headquarters of the Guard Corps) had been landed on the 1st of August on the platform of the depot at Mannheim. We passed the 2d of August in that city. On the 3d we went to Durkheim and on the 4th to Kaiserslautern. Just as we reached this city the three ammunition trains forming the first echelon were debarked, after which the cavalry division of the Guard and the corps artillery left the train at the same place. I had then at my disposition at least the first echelon of my ammunition trains, but the commandant of the battalion of trains—Major Von Heineccius—was not there. He had received orders to conduct the six remaining trains from Berlin by the highway to Wittemberg where they were to take the rail. That is all we could learn of those six trains; we had no other news of them until the 15th of August. It was very difficult to direct the

march of the three first trains for the three army corps marched upon a single road. The corps which followed us barred the road to the train, and nevertheless, it was a necessity that they should follow us. How many collisions and interferences were there, there? Even at night the road was scarcely ever free for them. It was only after the deployment upon the enemy's country was accomplished, that is, on and after the 9th of August, that these three trains could advance regularly.

On the 15th of August a report was received from Major Von Heineccius announcing that on the 14th he had reached Sarreguemines with the six remaining trains. On the 6th of August he had been placed on a railroad train and had quitted it on the 8th in the vicinity of Mayence. There no one could give him any precise information as to the point towards which the Guard Corps had been sent, and therefore he committed himself to the care of Providence and marched westward until he should find the trace of his corps.

According to his report he intended to take the columns on the 15th as far as Verminy, near Morhange; on the 16th to Nomeny; on the 17th to Dieulouard. If you will take the trouble to follow upon the map the march from Mayence to Dieulouard you will agree with me that such forced marches, executed by small bodies of raw troops, merit the greater praise in that the trains had no orders at all, but went toward the front upon their own responsibility, moved only by their zeal for the Service.

Early in the morning of the 16th of August, Major Von Heineccius, who had come on in advance of his command, presented himself to the general commanding the Guard Corps, and on the evening of the 17th the corps orders mention for the first time the second echelon of ammunition trains.

It was certainly greatly due to chance that on the evening preceding the day of the grand decisive battle it had been possible to give for the first time regular orders for the last part of the corps which had left the railroad, and that thus the replacement of exhausted ammunition from the trains was rendered possible.

On the 16th of August the headquarters of the corps reached Bernécourt; the first echelon of the trains, Manonville; the second, as I have already stated, Nomeny. For the 17th of August the corps was ordered to reach the Meuse; the first echelon was directed upon Apremont, while the arrival of the second echelon was expected that evening at Dieulouard.

As we know, the events of the 16th forced the Guard Corps to take on the 17th a direction toward the north. Thereupon the trains of the first echelon were ordered from Manonville to Limey by an order modifying the first one, dated 3 A. M., August 17th, and brought by an aide-de-camp. By the orders given the Guard Corps on the evening of the 17th, which required that the Guard should be reunited on the morning of the 18th at Mars-la-Tour, the ammunition columns were so directed that the first echelon should reach Sponville at 7 A. M., and the second reach Thiancourt at an hour not fixed.

On the 18th, shortly after the first cannon shot was fired, the commandant of the ammunition trains reported to me and demanded orders. I decided at first that the trains should advance as far as Doncourt, and I posted them

behind and within reach of the Guard Corps, which was then fully engaged. This station was made known to the infantry divisions and to the artillery of the corps.

At the beginning of the battle, therefore, I was filled with a sense of assurance and of security, for the results of the practice firing which we had just finished, before taking the field, had shown me that the batteries had learned their lesson perfectly, and that they would be invincible,—that the effect they would produce would be irresistible,—if there was no failure of ammunition; and the full supply seemed now to be assured. But in the course of the long cannonade, General Von Colomier, Chief of Artillery of the Army, came along the line of batteries and warned me that he had assigned all the artillery ammunition of my first echelon to the III. and X. Corps. "They expended yesterday," he said, "such enormous quantities of ammunition that their own trains are not able to make good the deficiency." Imagine the terror which seized me! I had engaged in the most violent struggle, and in the midst of it my most vital organ was taken from me. In spite of this I could not, in my own mind, say that the general was wrong. *He* had to provide for the whole army, and of what use would the batteries of the III. and X. Corps have been if they had no more ammunition? Could he know in advance which batteries would expend the most ammunition this day? This news caused me a disappointment so much the greater as, a few minutes before, the commandant of the trains had left me for the purpose of causing his caissons to advance to the position assigned them between Habonville and Batilly. When he returned to me he made a report which consoled me somewhat. He told me that he also knew of the orders given by General Von Colomier, and that he had immediately sent to Thiancourt the order to the second echelon of trains to push to the front if it be possible as far as the first echelon. Yet I could hardly hope that they would reach us on this day. They had actually reached Dieulouard the evening before after the different forced marches that they had been obliged to make since their departure from Berlin. From Dieulouard they had traveled 14 miles to Thiancourt, which was distant from the field more than 18 other miles.

Let me state in passing that after having made his report the commandant remained with me in order to see upon what point the ammunition was giving out. Then he accompanied the Battery Prittwitz, which he had commanded in 1866, upon the height of St. Privat, where it was the first to open fire, as I have before stated. The trains of the second echelon accomplished more than we had dared to hope from them. They had not awaited the order to continue the advance. The uproar of the gigantic battle had made itself heard as far as Thiancourt and they had therefore continued the march. Two ammunition trains (Planitz and Keudell) marched straight to the field of battle, and, breaking a road with the greatest possible energy through all sorts of vehicles of the supply trains, ambulance trains, parks of carriages, etc., which covered the roads, they succeeded that same evening in furnishing ammunition directly to the batteries, to each of which they sent one caisson or two. It is in this way that the threatened embarrassment was evaded, bnt they succeeded only by dint

of the energy they displayed, by the independence with which they knew how to act, and their foresight as to the needs of the batteries. The next day, at day-break, the transfer of ammunition to the limbers of the pieces and to the battery caissons was made, and by 2 o'clock in the afternoon all the five artillery ammunition trains were entirely empty.

I have already had occasion to say to you that for this operation the batteries had no writings to make. They sent simply their empty caissons to the trains; there they filled them. The conductor indicated the number of the battery for which the ammunition was destined and signed a receipt.

But our trains provided for still another deficiency. The batteries had lost 275 horses and the reserve horses were not sufficient in number to replace them. The trains gave us 200 animals, for but a small number of horses were required to draw the empty trains, and they were at liberty to fill up their number during the return march by requisitions. They also gave us officers. Many of our battery commanders had been killed or severely wounded. The officers commanding the artillery ammunition trains, who, to the number of four, belonged to the regiment of field artillery of the Guard, took command of batteries. To replace them we took the officers of the reserve, of the cavalry of the Guard who had been assigned to us as auxiliaries and who in the interval had been instructed in the service of the trains. They were assigned to the command of the ammunition trains.

A certain pedantry inherent in all officers who have served a certain length of time made me fear at the outset that these officers would not be apt at fulfilling their duties. But results showed that no better choice could have been made. In peace time these gentlemen, in their quality of great landed proprietors, had acquired great facility in the management of men and horses. They understood harness, they were accustomed to act with independence and upon their own responsibility, and this is what was often required of them when they were without orders. For the preservation and care of the ammunition, and for keeping the accounts, the column had its man specially detailed.

I very soon discovered what excellent results these commandants were able to achieve. As soon as they had disposed of their ammunition they retraced their route. The first of them started back on the afternoon of the 19th of August.

To give you a complete idea of the mechanism of the service of replenishment there remains to speak of the method employed in furnishing the ammunition to the trains from the depots.

During the battle of St. Privat General Von Colomier's assistant had informed me that the reserve park of field ammunition of the Second Army had followed the army to Herny, east of Metz, and that the trains could obtain their new supply there. The artillery trains that we had emptied, to the number of five, were directed upon Herny and an infantry half-train went with them, for the foot soldiers had had, comparatively, expended a small amount of ammunition. The commander of the battalion of trains remained with the three and one-half trains which followed

the corps. The battalion staff, from the receipts given by the conductors of caissons, ascertained the amount of ammunition remaining on hand and made requisition upon the established forms for the amount necessary to refill the empty trains. These requisitions were sent by the chief of artillery of the corps to the general commanding all the artillery of the army so that he should send to the reserve park the order for the necessary issue. At the same time the corps chief of artillery notified the park by the field telegraph of the amount of ammunition required. The matter was arranged, therefore, so as not to lose a moment, while at the same time the accounts were kept exactly and with minuteness. Supervision over the batteries was exercised by unexpected inspections of the caissons and limber chests, so that it was certain that the full supply was really on hand.

But the refilling of the trains did not proceed so easily. They sought to reach Herny in going by Pont-à-Mousson. But at Herny they obtained—nothing at all! I suppose that the ammunition which was accumulated there had been exhausted to replace the enormous quantity which had been expended by the first and second armies in the three battles around Metz, for it must not be lost to sight that in this war the number of pieces which fired and the amount of ammunition expended reached to figures of which we had no idea in preceding wars.

My trains then continued their route and finally found the supply of which they were in need at the Prussian fortess of Sarrelouis.

They then marched westward. They learned that the Guard Corps formed a part of the Army of the Meuse and set out to find it,—found its trace, and followed it up making forced marches, and all this they did without having received a single order of march, for the staff of the Guard Corps never knew exactly where the trains were.

When do you think they rejoined the corps?

As for myself I thought I was dreaming when, on August 29th, I was informed that the first of the trains had reached the corps. On the 31st of August, that is, the evening before the battle of Sedan, they had all arrived. The first train had then travelled 210 miles in ten days; the last train had made 233 miles in twelve days. But of these ten or twelve days it is necessary to deduct the one in which they received the ammunition and loaded their caissons.

On the 1st of September the trains reached the village of Villers-Cernay, where they proceeded to refill the batteries, a part of them the same evening. I have already said that at Sedan we fired but 5,000 shell, that is, we had not expended all the ammunition in the possession of the batteries. but the bombardment of Montmédy on the 4th of September cost us again almost 4,000 shell, and on the 6th of September all the artillery trains were again entirely empty. They retraced their steps again by Saint Mihiel and Pont-à-Mousson, and again, in great part at least, had to go as far as Sarrelouis, from which place they started again to rejoin the army. When we arrived before Paris on the 19th of September, the first of the trains (Räbel) had already rejoined the corps. Between the 6th and 19th of September—14 days—it had marched over 326 miles. It had made an abso-

lutely enormous march, which will appear the more astonishing yet if we consider that it was often necessary to stop on the road, or that the way was obstructed and that it was necessary to make up for lost time the next day by making a still more considerable march.

I was not desirous of knowing how many horses were left along the road, which it was necessary to replace by making requisition upon the country. I did not push the spirit of control so far as to inquire how many times, and for what length of time the men forming the escort were taken up on the wagons and what distances were thus traversed at a square trot. I was too happy that the ammunition should have arrived and that the trains had both teams and equipments complete. In truth they had not lost much time along the way in seeking lodgings of the quartermaster. They marched in the morning, they marched in the afternoon; at noon they made soup in bivouac, and they passed the nights for the most part in villages situated far from the main routes where their escorts performed the necessary guard duty.

The engagements which followed were not so violent that the supply of ammunition presented any great difficulty; besides, at this time the park of field ammunition had been transferred to Épernay.

In spite of the fact that in all the battles in which I have taken part during the War of 1870–71 we always succeeded in renewing the supply of ammunition in time, I have none the less become convinced that the quantity we transport with us—with the batteries as with the trains—is not sufficient.

We could not be certain, and that particularly in the principal battles where great masses of troops were assembled with a view to striking a decisive blow; we could not be certain that the trains would succeed in breaking a way through to the fighting line on the same day on which the battle was fought.

For this reason we should furnish the batteries in their caissons and limber chests with as much ammunition as they can expend in a battle lasting a whole day. We did not have this amount in 1870. On the 18th of August we were not engaged till after noon, and nevertheless we had to have recourse to the trains that evening to avoid embarrassment. I am sure that the supply would have been insufficient if we had been engaged from early morning. I also estimate that the quantity of ammunition carried in the trains in 1870 was insufficient. After the expenditure of ammunition made on the 18th of August all the trains were empty. If this expenditure had been greater, which, as I have said, would have been the case if the battle had begun earlier, there would not have been in the trains the quantity of ammunition needed to fill up the batteries for a new battle. But it was necessary that they should be filled with a view to this possibility in order to avoid tying the hands of the general-in-chief for all the time that the trains were seeking a fresh supply.

The question has been raised, since the war, as to what reduction could be made in the quantity of infantry ammunition transported in the trains, having in view the facts that in all the War of 1866 there was fired only a mean number of from seven to eleven cartridges per man; and that in

1870 but a small number of caissons of infantry cartridges had been used when all the artillery trains had been emptied.

But it is not possible to draw from this experience a clearly defined conclusion.

In 1866 the surprise caused by the efficiency of our breech-loading muskets led usually to a very rapid decision of the fight so that the infantry combats were of short duration.

In 1870, on the contrary, our brave infantry was obliged the greater part of the time, to endure patiently the fire of the enemy's musketry whose range was greater, so much so that it was not possible to reply.

When a struggle shall take place between two infantries whose armaments are equally good, there will be a greater expenditure of ammunition on our part than during the last two wars.

To be able to form an opinion on this subject, it will be necessary to disregard the experience gained in these wars and to look at the matter from another point of view.

I told you in one of my former letters that I once caused a company on the war footing and a battery on the war footing to open a rapid fire, side by side, on the firing ground; the firing being properly directed and done by instructed men; and that the two arms expended quantities of ammunition approximately equal both as regards weight and cost. It is the weight which plays the decisive part when the subject considered is the supply of ammunition.

If we admit that the two arms may be engaged all day and that they keep up a rapid fire, violent but properly directed, we must reach the conclusion that each of the companies will expend, as regards weight, as much ammunition as each of the batteries.

An army corps contains 25 battalions, or 100 companies, and 19 batteries, and therefore five times as much infantry as artillery ammunition will be required. But the artillery will expend proportionally more because it will fire at greater distances and consequently for a longer time. It may be admitted that the range of artillery is five times superior to that of infantry, and for this reason a battery will use in battle five times as much ammunition as a company. My conclusion is that we shall be obliged in future to supply an army corps with as many trains of infantry as of artillery ammunition.

If you wish to know the proportion between the number of rounds of shell and of canister which will be required, I think the figures given by the war of 1870 will still hold good. The batteries of the artillery of the Guard expended throughout the whole war about 25,000 shell and one round of canister. This last was broken in transportation.

If you think that I have written at very great length upon this question of the supply of ammunition, please consider this: with ammunition, the artillery on clear ground is invincible in its front; without ammunition, the pieces are but impedimenta for the army to which they belong and trophies for the enemy.

THE NEW GUNPOWDER AND GUNS.

By MR. JAMES A. LONGRIDGE.

(*Reprinted from Engineering, London.*)

WITHIN a recent period very interesting statements have been made with reference to the efficiency of our naval armaments and the most recent developments of gun construction and gunpowder manufacture.

Among the former is the excellent letter of Admiral Mayne, in the issue of the *Times* of September 21st. Most cordially do I agree with him in his deprecation of monster guns afloat. No larger gun than a 12-in. or 12½-in. of about 50 tons is required, and such a gun will pierce any armor, now afloat or likely to be so, at 1,500 yards, a distance beyond which it is practically useless to fire against armor. Such guns may be mounted on disappearing carriages, as has actually been done on the Russian warship *Catherine* II., the heavy guns of which are mounted on Anderson's disappearing hydraulic carriages.

One can only contemplate with dismay the fate of our 110-ton and 67-ton guns mounted *en barbette*, or even in turrets, exposed to the fire of such a vessel as, for instance, the *Piemonte*, pouring out a storm of twenty-four projectiles of 100 lbs. each and thirty-six projectiles of 45 lbs. each, or sixty projectiles per minute, any one of which, by a fair hit, would put one of the large guns out of action!

Questions were asked in the House of Commons in August last as to the effect of 4.7-in-quick-firing guns firing upon the large guns mounted *en barbette*, but the only reply elicited was: "The subject has engaged the serious attention of the Ordnance Committee, and that experiments have been tried, but that in the interests of the public service it is not desirable to make public either the results or the opinion of the Committee;" to which was added on the following day: "It has not been found practicable to give the chase of these guns greater protection, but, as they will usually be pointed towards the enemy, they will present a comparatively small target." But what if there should be two or three enemies approaching from different directions, or if one of the 180 projectiles per minute should find its way into the 16¼-in. diameter muzzle of a 110-ton gun? Why, even if a 3 lb. shot were to do so it would certainly disable the gun.

I believe every naval officer will agree with me that the length of the modern guns is a very serious inconvenience. It is due chiefly to the alteration which has been made in the powder. The "spirit of artillery," as it was called by General Brackenbury, has been so emasculated that high muzzle velocity can only be obtained by large charges and long guns. The late trials of the quick-firing 6-in. guns have been put forward as evidencing a remarkable improvement in the manufacture of powder, and at the recent general meeting of the Elswick Ordnance Company, Lord Armstrong

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referred, in eulogistic terms, to the performance of the 6-in. quick-firing gun and the Chilworth smokeless powder.

In the published accounts of the trials of the *Piemonte*, it was stated that, with this gun and a charge of 38 lbs. of Chilworth powder, a muzzle velocity of 2,300 ft. per second was imparted to a projectile of 100 lbs., whilst with the Service 6-in. gun the velocity of the same projectile with 55 lbs. of brown powder was only 1,970 ft. per second. But it was not pointed out that the new gun was 40 calibres in length, whilst the Service gun with which it was compared was only 26 calibres, being an excess of length of not less than 7 ft.

To make the comparison fair as regards the powder, the service gun should be of the same length, in which case it would have given a muzzle velocity of 2,340 ft. per second. Of course in the above case it must be admitted that it is shown that 38-lbs. of Chilworth powder was equal to 55 lbs. of brown powder, but the question may fairly be asked what would have been the velocity with 38 lbs. of a strong powder such as pebble? My answer to this is, that in a 6-in. gun of 40 calibres in length with 38 lbs. of pebble powder and a 100-lbs. projectile, the muzzle velocity would be at least 2,600 ft. per second.

Another way of stating the comparison is this: What would be the length of a 6-in. gun to give the same velocity with 38 lbs. of pebble as would be given by the new quick-firing 6-in. gun with the same charge of Chilworth powder? The reply to this is 22½ calibres. Consequently the respective lengths of the guns would be:

	ft.
New gun with Chilworth powder.....	20
Ordnance gun with pebble "	11¼

Of course the increased effect of the short gun implies the greater strength of the pebble powder. No actual pressures are given in the reports of the *Piemonte* trials, but Lord Armstrong speaks of these as "very permissible pressures." I presume about 15 to 17 tons per square inch. Now the pressures with 38 lbs. of pebble would be about 28 tons per square inch.

What is a "permissible" pressure depends solely on the strength of the gun, and it is perfectly certain that by the adoption of wire a gun may be made which will be less strained by an internal pressure of 28 tons than a forged steel gun of the same calibre with a pressure of 17 tons. The fact is, that the present weak powders are a necessity for weak guns, and the excessively long guns are a necessity for weak powders.

I have for long maintained that our ordnance authorities were on a wrong track, that of weak powder, heavy charges, and long guns. I do not expect that the repetition of my opinion will have any effect, but possibly the stern logic of facts may at last drive the lesson home. Already we have the experience of the 110-ton guns of 30 calibres. We are informed that the new 6-inch quick-firing gun of the *Piemonte* is 40 calibres in length, and it is said that guns of even 50 calibres are contemplated.

For land defenses such guns may be useful, but they must be made much heavier, and especially in front of the trunnions, than any gun now made.

For naval purposes they are utterly unfit. I am satisfied that a 12-in. gun about 25 ft. long and weighing about 50 to 60 tons, and mounted on a disappearing carriage, is the heaviest gun that ought to be put on board a battle-ship. Such a gun, fired with a powder of about one cubic inch grain, would give to a 1,500-lbs. projectile a velocity of 1,830 ft. per second at 1,000 yards from the muzzle, and this would have the same energy per inch of circumference, and consequently the same power of penetration as the 1,800-lbs. projectile fired from the 110-ton guns of the *Victoria*.

It is greatly to be desired that the whole question be reconsidered, in the case of our new battle-ships, before it is too late.

LETTERS ON INFANTRY.

By PRINCE KRAFT ZU HOHENLOHE INGELFINGEN.

Translated by Lieut. Odon Gurovits, 11th U. S. Infantry.

VII.

THE COMPANY OFFICER.

THE contents of my last letter naturally caused me to consider the importance of the line officers, *i. e.*, the chief of the company and his lieutenants. They are actually the soul of the complete executive and instructive infantry unit.

The same can be said of all the other arms of Service, but taking into consideration that, in computing the strength of bodies of troops, cavalry is computed by the number of horses, artillery by the number of pieces, and infantry the only arm of Service computed by the number of men; everything indicates that, with the latter arm of Service, the human psychological element is the only decisive one, and the influence upon the individual man is more preponderant in this case.

This influence, the forming of the individual mind, has its origin only with the chief of the company and his lieutenants (*i. e.*, the company officers). The non-commissioned officers are simply their assistants; they are created by the company officers and execute whatever may be ordered by the latter.

Again, the field and higher officers are too remote from the men, and on account of the great number of men, cannot be familiar with the peculiarities of each individual man. The company officer alone knows: Peter, Kunz, Meier, and Müller. He instructed the men, praised and reproached, rewarded and punished them. This is what causes the soldier to follow the officer confidently in battle; and the officer best known to the soldier is the one who carries him away in action to perform deeds of bravery.

Who has not witnessed examples of this kind? At the redoubts of Düppel, while skirmishing with the enemy's outposts, it was intended to surprise the enemy by attacking him after dark in his rifle-pits, expecting to occupy the latter with our outposts.

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On the 2d day of Easter, 1864, it happened that the companies of the 18th and 8th regiments rushed past these pits, instead of intrenching themselves therein; and at daybreak they found themselves at the front of the earthworks, unable to find shelter, from whence they were then forced to retreat with considerable loss. A soldier born in Upper Silesia, when asked and reproached by his land-holder, who was present in his capacity as a Knight of St. John, why they had advanced so far, answered, in his broken German: "But if Lieutenant runs ahead, one must run along."

In a fight in and around a village near Paris, half of a company had occupied a cemetery alongside of the village. The regiment to which this company pertained, had up to that time, always performed wonders of bravery. The enemy, however, upon attacking, took the cemetery within a remarkably short time; this surprise was felt deeply by us and we had to storm it again. After the engagement was over I spoke to men pertaining to the force which had first occupied the cemetery, trying to ascertain the causes which had led to its occupation by the enemy. The men answered candidly: "Yes, we did not have any officer to direct us what to do, therefore we went away." Unfortunately, the hostile artillery fire had placed both officers *hors de combat* at the beginning of the engagement. One of them had been killed, the other wounded and unconscious. These are examples enough.

Every infantry officer, who ever witnessed an engagement, can cite many more to prove that, in our Army, the company officer is the soul of that arm of the Service, and that he inspires it with *esprit*. And with what unconditional confidence do our men follow their officers!

General Von Rüchel said in the last century: "The spirit of the Prussian Army rests with its officers."

The truth of this statement is more apparent since the fighting infantry masses, at the decisive moment, must dissolve themselves into atoms which can be controlled by the lieutenant's voice only. Although I referred in my second letter to the fact that one is justified in believing that it was not the Prussian school-teacher, but the Prussian non-commissioned officer who won our battles; now, my meditations almost force me to the conclusion that it was not the school-teacher, not the non-commissioned officer, but the Prussian lieutenant who won our battles.

Of course the lieutenant is, year after year, the school-teacher of the men.

By making this statement, it is not intended to detract from the merits of the higher officers, and I anticipate that, further on, I shall come to a different conclusion. Even within the limits I intend to observe to-day, all misinterpretation of the above somewhat paradoxical sentence might be removed by observing that all higher officers once were lieutenants, and that all lieutenants expect some day to be promoted to the higher grades.

To-day we will confine ourselves mainly with the lieutenants, or, better still, with the company officers (including captains) of infantry. And we now ask ourselves: To what is due this influence [wonders of bravery producing] upon the masses who, in time of greatest danger, obey the gestures of their officers, notwithstanding that the loosening of the close order, due

to the new mode of fighting, withdraws the individual man from their control and supervision?

This influence depends upon the officer's indefatigable energy, his untarnished honor, and his Spartanlike contentedness.

There were times in peace when the duties of the officers consisted in doing guard duty, and in the spring and summer to drill a few hours daily, or to run across the fields during the manœuvres. These times originated the nick-names given to lieutenants, such as street-loungers, and others still common in the people's language. When do you see now a lieutenant on the street seemingly idle? At the most at noon, when he seeks the lunch counter, while the men eat their meals, and again at 3 or 4 o'clock going to dinner, and on Sundays when he employs his time to make social calls. At other times he is constantly busy. As soon as the sun rises in the horizon he has to inspect the men, see whether they are neat and clean, and correct them when the occasion requires. Then he has to instruct and drill each individual man—gymnastics, setting-up drill, mechanism of the rifle, rifle practice, field exercise, internal administration; everything is taught, and in everything the officer must be a model himself. The men will only learn what the officer excels in. Thus he is occupied constantly during the whole day. Any one glancing now and then at the drill on the drill-ground thinks that a few hours ought to be sufficient to master that little drill. The infantry officer, however, knows how much pain and labor it takes, and any one who reads my former letters without prejudice will see into it likewise, even if he is no soldier. Consider the time which must be spent at target practice. A company fires about 15,000 to 20,000 shots at the targets a year and no shot is fired except in the presence of an officer. The latter is held responsible for the necessary precautions and he has to see every shot recorded in the individual target record books. It is very seldom that a company has more than two officers available for this duty.

What claims upon the nerves, perseverance and sense of duty of the officer who stands for hours, regardless of weather, winter and summer, without neglecting to pay full attention to each shot fired, to the pointing of the rifle, the aiming precautions, and recording! Should he violate any regulation, neglect any precaution, it might easily result in an accident and a court-martial would follow. Then consider that often these duties are executed by the officer while having to contend against the ill-will of the population, even that of the civil authorities. It happened that mayors had the audacity to forbid target practice, officially, on account of a shot fired prematurely while the muzzle of the rifle pointed high into the air and the bullet struck the grounds beyond the target butts. The dangerous zone of our present rifle is great; we had in battle accidental casualties at a distance of 4,000 paces from the enemy's skirmish line.

Many think that the lieutenant can rest after he has finished his morning and afternoon duties and goes to dinner at 4 o'clock. On the contrary, dinner over, and he again meanders to the barracks to give theoretical instruction—one teaches the non-commissioned officers, the other, the men. It is true that in the *Fliegende Blätter* the soldier says: "The theoretical

instruction is that instruction which is not practicable," but the lieutenant enjoys the joke and laughs at it heartily, especially as he knows how seldom this definition is applicable.

This instruction, as far as military matters are concerned, is compulsory and yet it extends beyond mere military matters—much is taught which is of the highest importance to man in his civil pursuits and the few joining the ranks, not able to read and write, learn it while with the colors—Many learned more while with the colors than they did during their early school-days. I remember, while serving as a lieutenant, a recruit who, though bright and talented, had his early education entirely neglected. I taught him reading, writing and arithmetic; in later days he was promoted to be sergeant and finally made an excellent auditing officer in civil life. The results achieved, due to instruction while in the ranks, are more satisfactory than while in school. The men at the age of 20 and over, see the advantage of education quicker than when schoolboys and are more settled down. Therefore, they become more attached to their teacher and obey his authority in time of privation and danger, when the example is set by the teacher. All this does not even exhaust the lieutenant's duties. In addition to his practical duties, he continues to increase his professional knowledge. He must keep up gymnastics, he must study, lecture, attend all of the lectures delivered in the regiment, write scientific essays, and take part in the "tactical Kriegsspiel."

After the instruction of the men, the remaining hours in the evening are thus disposed, three or four times during the week and the other evenings only, are available for his recreation and are spent mostly with his comrades.

Thus the requirements of a line officer increase to such an extent, that those who succeed to be detailed for a course at the Academy of War, can consider this deep and straining study as recuperating after the hardships of the service with the line. Among the company officers, the chief of the company is even more confined on account of his duties. He shares the hardships of his officers and, while the latter attend to the instruction in detail, he must go from one to the other, superintend, teach and instruct the young, inexperienced lieutenants. After his day's work, upon reaching his family and home, he might intend to rest for an hour or two, or he might desire to devote the same time to his family, but only too frequently does it happen that his orderly sergeant reports a case of insubordination which requires careful investigation, or punishment; in the latter case a lengthy entry to be made in the record of punishments awarded. At another time he has to settle some accounts for his company, again he is required to go to the company clothing store-room to see after the tailors, or some irregularity noticed in his squadrons requires investigation, etc. He is held responsible for the smallest details and is supposed to know everything relating to his company and men. It is proverbial that a company chief is unable to enjoy his existence, never being secure from interruption. I am aware that the officers of like grade of the other arms of Service are busy in a like manner. The infantry lieutenant, however, at the time of the greatest strain, during the drills and manœuvres, walks while the cavalry

and artillery officers are mounted; the expenditure of physical power, therefore, is greater with the former officer.

These efforts and exertions alone would not be sufficient to exercise such an important influence upon the masses, which is due to the officer's cherishing his untarnished honor above everything. The private knows of this, and also knows that he can depend upon the unblemished honor of his officers unconditionally.

The soldier acknowledges that, in regard to honor, the officer stands far above the soldier; he does not stop to question it, knowing that the officer will always and everywhere set the best example, and that, in order to keep his honor untarnished, he will be the leading one always in time of danger. Thence comes the feeling of impossibility to abandon an officer in danger, and thence the *esprit* of the men expressed above, "If Lieutenant runs ahead one must run along."

One could write volumes should any one desire to exhaust everything relating to the honor of the officers. It would, however, be like carrying owls to Athens, should I try to inform you upon this subject. The high standard of the officer's honor is the object of the respect of every educated citizen as well as the object of envy of all those who desire to undermine existing social and political conditions. How the latter howl and rejoice when one of the ten thousand violate this untarnished honor. How they fill columns of newspapers for a length of time with it, attempting to throw this blemish upon the entire profession; nevertheless, it is useless, I say, since the profession remains honorable. It banishes such offending individuals without pity and forever from its ranks, and it gains in respectability by such regardlessness and candor; not clothing itself with a hypocritical dress, but displaying its inward uprightness.

The best testimony to prove the untarnished honor of the officers, is the bitter envy of those men who, devoid of all honor, try to undermine everything which was hallowed by family bonds as well as by the fatherland.

Those who, though not soldiers, respect these bonds, may be relied upon to give a candid answer.

One will hear, then, how they envy the preferred class of officers, but every citizen esteems it an honor if any member of his family pertains to this class and every one is pleased to have officers visit his house and family, and every public resort where officers congregate is accepted unconditionally as respectable.

I know very well that, as far as the infantry officer's honor is concerned, that of the officers of other arms of Service is on the same level, and I do not infringe upon the honor of any officer by making this point conspicuous with infantry. But the infantry represents the masses, and, furthermore, it comes first with regard to the third point raised: "The Spartanlike contentedness" which, in spite of all the hardships, is the expression of probity. It is true that many cavalry officers are just as contented as those of the infantry, but it is admitted that those officers who have private means prefer to join the cavalry, *i. e.*, such officers do not submit to the hardships mentioned.

XUM

On the other hand, by far the greater part of the infantry officers are poor, very poor, and the salary intended to reward their indefatigable energy is exceedingly inadequate, so inadequate that our great statesman, while representative of the people, spoke of the splendid misery of the lieutenants. Now, the allowances of our lieutenants are so scant that any one without private means will meet bitter privations, which he suffers quietly by himself in his hamlet, yet in public he is expected to and does satisfy what his social status demands.

It cannot be denied that many families find means to provide for an allowance to their sons intended for a military career. Many, however, cannot do so. I accepted many candidates from the corps of cadets whose mothers (officers' widows) could do no more than provide the paltry sum of five thalers once forever to start their son in his new career, and perhaps an old coat which in its best days had been worn by his father. Others, members of old noble families, could not even provide this, although their sisters expected to be assisted out of the lieutenant's salary. It often happens that an officer invited to a sociable tea develops much mirth by his voracious appetite. In later days, when the same officer is better off, he will admit that this appetite was due to the fact that not having had the means he did not partake that day of any food until tea. Again another, to provide supper, will buy the bread issued to his servant, who, possibly, is a wealthy farmer's son, pretending that it is beneficial to his health to eat such bread ; the truth, however, is that it is the cheapest bread.

It is not necessary to mention that such officers freeze in their home in winter, not having means to buy fuel ; nor do they wear an overcoat in order to save the wear and tear of their blouse or coat, of course, pretending that they cannot bear warm clothing. If it is required to appear at parades, on the street or to attend a social gathering, these Spartans are the ones who will surpass in elegance of appearance and cheerfulness. Do not interrupt me by saying that there are exceptions to the rule, that there are officers who are contaminated by the universal desire for luxury, who squandered theirs and their family's fortune, and who, finally, are crushed by debts. Why should an officer not once in a while be attacked by the universal weakness? But these exceptions prove the rule, and the sensation caused by these exceptions speaks better for it than the Spartan-like conduct of our lieutenants.

What, then, does the private think of such officers? It is not pity but respect which he feels. The soldiers are sure to be informed about the private life of the lieutenants by their servants, who are the men's comrades, and if the private sees that the lieutenant is paid less in proportion than the soldier, that the officer cannot afford to spend money for recreation and pleasure, but still remains his teacher in knowledge, an example in danger, why should the soldier not try to rival him?

It is true that the lieutenants receive poor pay—a skilled mechanic, be he locksmith, carpenter, shoemaker, or cabinet-maker, earns more in a week than the lieutenant receives. I do not mention professions requiring special technical knowledge which earn more still.

Why then does the Spartan stick to his profession? What causes him

to spend his means for an education that would open to him any career in order to prepare himself for a profession that necessitates a never ceasing activity in Peace and risk of blood and life in War, and all this without reward? It is but the strife for honor and glory, and the exceptionally honorable social position which he occupies in society, entirely due to his untarnished honor. As long as officers, even lieutenants, continue to possess this extraordinary honorable position, admitting them, although young, into every social circle, the profession is going to continue to exercise the same attraction upon the educated elements of society—abolish this social position and the highest salary could not replace the ensuing loss. Any one living but for money and sensuality might say, with Falstaff: "What is Honor? Air!"

The preferred social position occupied by officers in Germany is naturally the object of envy of all other classes, and, therefore, officers, especially some twenty years back, were frequently attacked. After these attacks made on the officers as a class, had rebounded without any impression, attempts were made to ridicule it. In consequence of the victories in our latest wars, this animosity diminished very much.

Upon my arrival in Berlin after the War of 1866, a merchant and well-meaning citizen asked me: How it was that the citizens of Berlin up to that time thought the officers of the Guards to be clannish and haughty. They feasted them, thinking it proper to do so after having achieved such a grand victory, and they found them to be the most amiable, modest, and educated men in the world.

I could answer this good man only by calling his attention to the erroneous opinion which the people in former times had of the officers of the Guards. Another reason why the animosity against the officers is diminishing is the institution of the class of officers of the Reserve.

As soon as the universal conscription bore its good fruits, it became natural for every educated, honorable young man, who did not serve a few years in the Army as an officer, to try to be commissioned as an officer in the Reserve. Why, then, should there exist an animosity against a class to which he pertains conditionally? How could the Nation in Arms attack its own leaders?

It is true that the affected lieutenant of the Guards sometimes appears still twisting his sprouting moustache, talking with a nasal twang and never without an eyeglass. He makes his appearance upon the stage of the world from time to time, generating universal mirth,—he is not necessarily always of the Guards. Should he once in a while seek to appear as the champion of his profession's honor we must not forget that experience teaches that just such persons, at the moment of greatest hardships and danger, make it a point of honor to be a success, and that they are then not to be found in the rear. Although at times such a person may provoke much ridicule, still there is much in him to demand our respect.

I do not know why I write all this to you who know all this as well as I do.

Well, after hearing the attacks made last year in the "Reichstag" upon the honor of the Army, I think not one of us should be silent whenever

an opportunity offers itself to give testimony in behalf of the matter and to express the desire that this *esprit* might be preserved for a long time to come in our Army.

I intended to examine the causes which led to the success of our infantry and I have found, as one of the important causes, the *esprit* of the corps of officers which finds itself expressed in its indefatigable energy, its untarnished honor, and its Spartan-like contentedness.

Military Notes.

A NEW INFANTRY SIGHT.

EVERY officer of infantry, must often have experienced the great difficulty of teaching men to aim the rifle with the same amount of fore-sight. We are all of us familiar with "full-sights," "half-sights," and "fine-sights," and, if left to himself, every Tommy Atkins would have his own theory and his own sight. And this tendency has done more to vitiate results than almost any other error. Even after a definite elevation has been given by the officer, he can never feel sure that the man directing the rifle has not entirely altered it by his method of looking over the sights, and has not thus introduced a fresh variable element which should not have existed at all. Thanks, however, to the ingenuity of Major G. A. Lewes, of the Northamptonshire Regiment, we are for the future to be able to reduce the chances of such mistakes to a minimum, and there is no longer to be any ambiguity as to the nature of the sight. We shall hear no more of "full" or "fine." There is only to be one sight with the new rifle, and that is to be the correct one; and, moreover, the one which it will require something like willful carelessness not to adopt. The Government have, we are glad to say, willingly accepted the new method, and the latest patent magazine rifles are all fitted with it. In the system of which we speak the fore-sight consists of a rectangular block of metal, which, in place of being brought to a point or edge, is split down the middle. This aperture is not intended to be looked through, but the line formed by the light through it is more clearly defined, and less liable to injury than if it were formed of any white metal or enamel. The metal round the split being particularly strong, there is no danger of its shape being altered by the fixing or unfixing of bayonets, or by any rough usage. This block is sufficiently high to enable the bayonet to be fixed without the accuracy of the aim being interfered with. The back-sight, which is to be used in combination with it, is formed of a hinged flap and a sliding bar. This bar has the upper edge bevelled and a square notch cut in the middle, from the centre of which there runs vertically downwards a fine white line. The notch is constructed of such a size that, when accurate aim is taken, the block on the muzzle which forms the fore-sight exactly fills it. When this is the case, it follows that the split we have alluded to forms a continuous white line with the line at the bottom of the notch. The man who is aiming the rifle has therefore only to look over a single point, namely, the top of the line which the two sights form. He has not to bring two points in line with the object, for, when the aim is good, the fore-sight and back-sight present only the appearance of a single sight to the eye behind them. The sights are so ar-

ranged that, when the flap is lying flat and the bar is down, they are correct for 200 yards, or, in other words, that the rifle shoots point blank to that distance. With a low trajectory a man would not be safe from fire thus delivered anywhere within 300 yards of the marksman. It will be much more difficult to make an error as regards elevation with this sight than with our present one, because, if the aim is bad, the block of the fore-sight will either appear as a black mass above the general line of the bar, or there will be a gap in the edge presented to the eye. The former effect will be particularly noticeable, and therefore the tendency to fire high—which is the most common failing—will be obviated more especially. As a general rule the object to be fired at would be a wide one, such as a line or mass of men, and therefore it is very important that in volley firing the elevation, at any rate, should be correct and uniform. However great the excitement, every man should be able to see that his block fore-sight comes in line with the edge of the bar, while if he can see nothing but a black mass through the notch, he knows his direction must be approximately right. It should be easier to keep to the same elevation, and in volley firing that will be a great matter, even if each rifle be not accurately aligned on any point or individual in the opposing force. The element of uncertainty which varying light causes in all shooting should likewise be reduced to a minimum, for the amount of fore-sight seen will be always the same. The construction of the fore-sight will also protect it from injury. The slit has a large mass of metal on each side to preserve it, and there is no edge or point to be broken, or knocked, or blunted. Furthermore, in firing even at long ranges all intervening ground will be hidden from the marksman's eye, and there will be less liability of his attention being diverted from the object. It is impossible in a short article to do full justice to this admirable invention, which is as simple as it is efficient, and as accurate as it is serviceable; but we think we have said enough to show how valuable is the service which Major Lewes has done in bringing it forward, and how thoroughly it is adapted to meet the requirements of the soldier. It is not, we believe, an exaggeration to say that, fitted with these sights, our new arm will be equal to the delicately-sighted match rifle, while, as regards strength and durability, it will be far superior to that which is at present in the hands of our men.

Higher praise than this it is impossible to give. If it were not so we should willingly give it.—*United Services Gazette.*

ELSWICK ARSENAL.

I.

ARMSTRONG RIFLED HOWITZER.

The employment of high angle fire by means of howitzers has come to the fore a good deal of late, and has been much discussed by military men. In past times, when the ordnance by which high angle fire was effected, was of a primitive description and erratic in its performance, it was considered an important means of defense against naval attack. With improvements in more direct firing heavy ordnance, high angle fire dropped into the background in the discussions of military authorities, but the high angle firing ordnance has lately been receiving its share of attention, and

this branch of warfare has, as we have said, once more come to receive more attention.

The Elswick firm have not failed to note the signs of the times, indeed they may be said largely to have created them; at any rate their rifled howitzer and mounting is the most prominent feature in this movement. We are, therefore, glad to take this opportunity of illustrating this weapon and saying a few words on the subject from information supplied to us by the makers, although we have only recently published illustrations of the Armstrong howitzer.

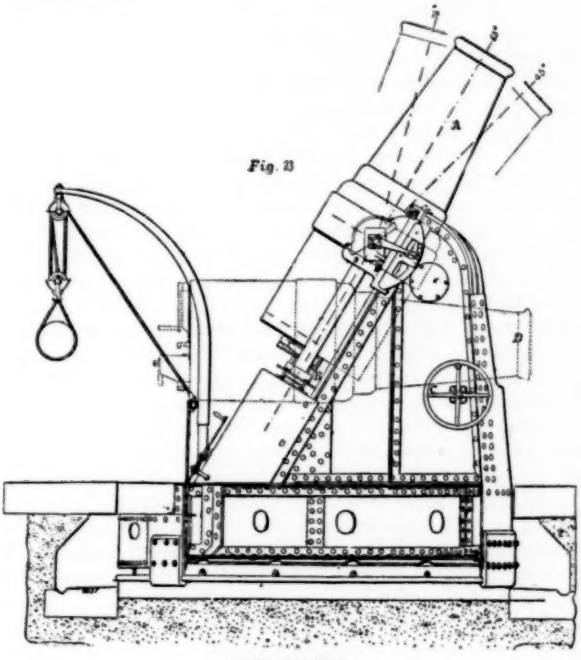


Fig. 13

11-INCH HOWITZER.

Figure 13 shows respectively a side elevation and a plan of a 11-in. rifled howitzer on an Elswick hydro-pneumatic centre pivot mounting.

The howitzer in question weighs 10.6 tons and fires a projectile of 478 lbs. (217 kilos.) weight, with a charge of 44 lbs. (20 kilos.) of powder.

In the employment of heavy breech-loading howitzers of this nature, arrangements must be made by which they can be loaded in a horizontal position; loading at a high angle with the heavy shell used being inadmissible as involving too many difficulties of detail and loss of time. It is, moreover, advisable to provide for a gradual absorption of the force of recoil instead of rigidly holding the piece as in the case of the old mortar bed.

The Elswick mounting provides for these two conditions and has the further great merit of embodying the disappearing system, by which the security of both howitzer and mounting, as well as of the detachment, is considerably increased.

As shown by Fig. 13, the mounting consists of a small carriage in which the trunnions rest, moving on an inclined slide, which in turn is supported by a horizontal platform rotating on a live roller ring. The carriage is formed of two steel castings, bolted together, and is fitted with bearings for the howitzer trunnions, as well as with sockets for the upper ends of the recoil rams. The slide consists of two steel frames bolted to the upper part of the platform, the sliding surfaces on which the carriage moves up and down being placed at an angle of 60 deg. with the horizontal. To these frames the recoil cylinders are also fixed. The platform is built up of girders and transoms of steel plates and angles. It is mounted on a live roller ring, and is fitted with training gear, loading crane, and frictional elevating gear. The mounting admits of elevations between 45 deg. and 75 deg. being given to the howitzer. The hydro-pneumatic cylinders, in which the recoil is absorbed, are made of steel. Each cylinder has two chambers, one containing the recoil ram, the other the necessary supply of glycerine and air. These two chambers are connected by a recoil valve and a by-pass valve, and by means of levers the arrangement is made to serve for elevating the howitzer for firing.

On discharge of the piece the liquid in the recoil chamber is expelled by the ram through the recoil valve into the air chamber. Both chambers in the one cylinder are in independent connection by means of pipes with the corresponding chambers in the other cylinder, so as to equalize the pressures in each during recoil. To get greater certainty in the manufacture of the recoil cylinders, they are now made of solid forged steel, and the chambers are bored out. It is convenient, therefore, for the air spaces to be obtained, by having a number of chambers (six or eight) in place of one. This system gives also the advantage that a recoil press could not burst explosively, if struck. By opening the by-pass valve the liquid is forced back again by the compressed air underneath the ram in each cylinder, whereby the howitzer is again raised to the position of firing.

For loading the howitzer (which is then at the bottom of the incline) the slide is turned to a horizontal position in fifteen seconds by the elevating gear which is fitted on the left side of the mounting, and is worked with a hand-wheel on each side by one man. A spring bearing is fitted in each trunnion block to receive the smaller trunnion arms of the howitzer. These small bearings take the whole weight of the howitzer when it is being turned in elevation, the friction being thereby considerably diminished, and the easy rotation of the piece greatly increased.

The training gear is fitted on the left side of the mounting, and is worked in front by means of a hand-wheel. On turning this hand-wheel the pinion on an upright shaft is revolved by bevel gear, and engages the training rack fixed to the racer.

If the howitzer has been raised to the firing position, and it is desired to lower it into the loading position, glycerine is pumped from the recoil

ram chamber to the air chamber of the cylinder by a small lowering pump:

The weights are as follows:

	tons.	cwt.	qrs.	lbs.
Carriage	0	16	1	0
Platform with cylinders	9	6	0	7
Loading crane	0	2	0	14
Pivot bracket, pin, and bolts	1	2	2	12
Racers and bolts, with rack and bolts	2	14	3	12
Total	14	1	3	17

Great efforts have, for some time past, been made to develop the use of this fire, for which the following advantages are claimed: It attacks a war vessel at its most vulnerable point, where the armor protection is at its weakest, and the effect of one or two heavy howitzer shell penetrating the deck and exploding in the crowded battery or among the machinery and engines of the ship might be most disastrous. As regards this question, some experience was gained during the experiments which took place near Bucharest last year. On this occasion 163 shell were fired from an 8¼ in. Krupp rifled mortar at a range of 2,750 yards, with results showing a mean error in range of 36.9 yards, and a mean error in direction of 11.6 yards. The actual diagram of the practice made shows that had the mark aimed at been the deck of a ship 328 ft. long by 65 ft. broad, 102 out of 163 projectiles, or 62 per cent., would have actually struck her deck had she been engaging the battery bow on. Had she taken up a less favorable position, 37 shell, or 22 per cent., would have hit the deck. In other words, it may be gathered from these results that one out of every five shells fired, the distance being known, would have struck an ironclad at ranges up to about 3,000 yards, assuming, of course, that the vessel was stationary, or nearly so.

Although the mortar with which these experiments were made is, within the limits of its capabilities an accurately shooting weapon, its mounting is old-fashioned and defective. There can be no question that the form of carriage hitherto used with mortars and howitzers tended to increase their inaccuracy of fire. The improved Elswick mountings, by allowing the recoil to take place at a mean angle of elevation, and with the free movement of the elevating gear, permit the shot to leave the gun without its direction being disturbed by the recoil, the first portion of which takes place before the shot reaches the muzzle, and as a consequence, the accuracy of fire is greatly increased.

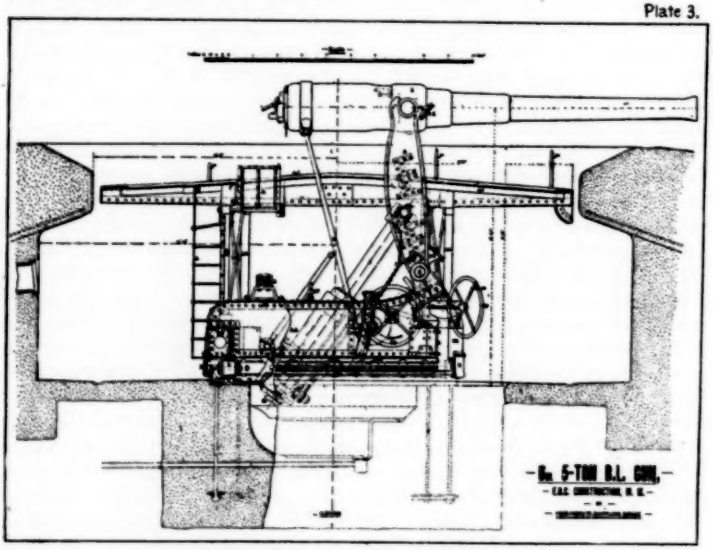
We are told that, as a fact, results have recently been obtained by Messrs. Armstrong with a 11-in. howitzer, mounted on the new Elswick carriage, which far exceed the accuracy hitherto obtained, or, indeed, deemed possible with vertical fire, and lead to the conclusion that vertical fire will henceforth enter on an entirely new phase, and be very largely made use of owing to improvements.

Three or four heavy rifled howitzers, mounted on this system, would prove very dangerous to an attacking vessel, for even one shell falling on and penetrating her decks might produce serious and, perhaps, fatal in-

juries. Against direct gun fire a ship, if an ironclad, can rely to a considerable extent on the armor which clothes her sides, but it is not possible under present conditions to furnish a ship with anything approaching to a corresponding protection against high angle fire. It is true, at the same time, that high angle fire, even from modern rifled howitzers on the improved mountings made by the Elswick firm, can never be carried on with all the accuracy of direct fire, yet as the howitzers and their mountings are relatively cheap, a large number can be employed, and thus the chance of a successful hit increased.

Where high angle fire is a feature of the defense, it is unlikely that any vessel will be able to anchor, and that in itself is no small gain. The fire from a ship continually on the move is far less dangerous than if she is able to select an advantageous position for delivering her fire, and anchor there. We shall have a few more words to say on this question of high angle fire against vessels later in these articles.

Plate 3.



8-INCH ELSWICK DISAPPEARING CARRIAGE.

II.

THE DISAPPEARING GUN CARRIAGE.

A very notable feature at the present time in the ordnance department at Elswick is the large number of hydro-pneumatic gun carriages which are in progress. In our description of the Newcastle Exhibition of 1887, we made reference to this method of mounting guns, which occupied a prominent position in the firm's fine exhibit. The illustration, which we now reproduce, shows this form of mounting. On page 115 of our forty-fourth volume we gave a very brief account of the disappearing system, but now

we are dealing at greater length with the Elswick ordnance department, the following more extended notice of a hydro-pneumatic disappearing carriage for an 8-inch breech-loading Armstrong gun will not be out of place. It may be stated that the particular mounting in question was erected at Shoeburyness and was the subject of an extended series of experiments made by the military authorities of that station. Some results of these experiments will be given later.

The mounting consists of a lower carriage, constructed of two double plate steel beams, connected at the front and the rear by curved box transoms, also of steel. On the front of the beams pivots the upper carriage, which consists of two steel elevators, connected together by upper and lower transoms, and carrying at about their centre a cast steel crosshead, to which a ram is nutted up; a steel spring buffer is inserted in the crosshead to take up some of the strain on the head of the ram in raising the gun up to the firing position. Cast steel brackets are riveted on the lower carriage to take the transoms of the hydro-pneumatic recoil cylinder. The mounting is held down by cast steel clips, and engaged in a circular ring firmly imbedded in and bolted down through about 6 feet of concrete. The traversing gear, which consists of a train of wheels gearing into a circle rack attached to a clip ring, is manipulated by means of two wheels fitted on the ends of the front transom; its action is quick and can be worked without difficulty by two men. Elevation is given by means of long arms which are attached at the upper ends to an elevating band at the breech of the gun, and at the lower ends to elevating arcs working in graduated cast steel guides, fitted on the outside of the beams of the lower carriage. The elevating shaft is fitted with wheels and friction cone which gears into the elevating arcs, and is manipulated by means of two wheels fitted on the outsides of the beams of the carriage. The elevating shaft is also fitted with an automatic regulating brake, which is brought into action by means of a pawl, only when depressing to assist the friction cone.

The cylinder, which is made of steel, is equipped with a recoil valve and a by-pass valve: the latter is opened by a lever for running the gun up and closed again automatically by a chain which is attached to the lever and the elevator on the gun arriving at the firing position. The average time which the gun takes to rise from the loading to the firing position is 9.4 seconds. A filling cock is fitted at its lower extremity, and half way up with an escape cock to charge the cylinder; the latter is opened and liquid (glycerine and water) pumped in till it commences to run out of the escape; this is then closed, and air pumped in till a pressure of 1,650 lb. per square inch is obtained.

A great feature in this mounting is a small gun-metal lowering pump worked by a long arm, which is detached when the pump is not required. This pump is generally in action, and when used transfers the liquid underneath the ram round the recoil valve into the outer chamber of the cylinder, thus allowing the gun to descend by its own weight. The gun can thus be pumped down easily by four men in fifteen minutes. (It has been actually pumped down in five minutes by using two relays.) This saves a great amount of time and labor at drill, or when testing the working of the mount-

ing. Also when firing with the reduced charge (75 lbs. powder) which does not give sufficient recoil to admit of loading, the pump has to be used between each round, taking fifty seconds to bring the gun down.

REMARKS ON HYDRO-PNEUMATIC CARRIAGE.

Pumping down was done in 7 minutes whole stroke of ram. One man could work the pump; two could work the gun right down. The live roller and ring and rollers were examined after firing, and were found not to be indented in the least. The clips were examined after firing, and showed no signs of straining. Plain water was used in the cylinder for this trial, and no appreciable leakage was noticed. The new arrangement of valve working and cut-off gear acted in a satisfactory manner. Trials at Shoeburyness, charge 100 lbs. B. P. powder, shot 180 lbs.

The mounting is protected in a circular pit 24 ft. in diameter, surrounded by a parapet 10 ft. high.

The emplacement is covered by a circular shield 1 in. thick, supported by four steel pillars which rest in sockets on the lower carriage. The shield is cut out in the centre to allow the gun to pass through. Access is obtained to the top of the shield by means of three ladders, one forward leading to a man-hole for looking-out purposes and laying the line of gun roughly on the object before it is raised, for which purpose two rough sights are fixed on the top of the shield, the other two ladders are fixed to the opening in the shield on each side just in the rear of the breech of the gun when in firing position; at the top of these are hinged small platforms for use in laying, which are brought into a vertical position, and out of the way of the recoiling gun, by a spring after the weight is taken off.

Exclusive of the man required for bringing up the ammunition, five men can work the mounting, viz., two to traverse, two to work the breech and attend to the elevating gear, and one to attend to the vent.

In our own country, and in the colonies, the disappearing system has been adopted to some extent; 10-in. guns having been so mounted at Harwich, Sheerness, and elsewhere. The Italians, however, who seem to have paid hardly less attention to matters of coast defense by land than they have to their navy, have carried the principle still further, and have applied the system to guns of 70 tons weight, and the Elswick firm have been entrusted with the execution of the orders. For the defense of the chief Italian arsenal at Spezia, cupolas designed by Gruson and containing 120-ton Krupp guns have been adopted. The expense of these structures and their armament must, however, be excessive, and although the vital importance of the position may warrant almost any outlay, as an exceptional instance, yet cost must necessarily be the governing factor in questions of land defense, as it is in naval policy.

Whether as efficient a protection could be obtained by a less sum spent in hydro-pneumatic mountings on the disappearing principle is a question far too wide and too delicate for us here to discuss, but the claim of the advocates of the latter system will hardly be disputed "that the economy in material, time and cost, by applying the disappearing system to guns of the heaviest nature, is very great."

We have at Malta and Gibraltar 100-ton guns mounted on the Armstrong protected barbette system; an arrangement which appears well adapted for the requirements of the locality. In armored turrets at Dover, containing

80-ton guns, we have another example of an adaptation of a principle fitted to the special features of the case. It has been said that the question of the defense of any point resolves simply to this: "How to provide a first-class artillery fire sufficient to guarantee the security of the position, combined with adequate, if not complete, protection." It is claimed that when the expense attending the installation of very heavy armored forts is exceedingly great ("millions of money") a middle course, entailing less expense, may be found in the disappearing system; whereby the same power of defensive fire may be associated with what is practically a sufficient protection. The protection afforded against hostile fire is not, it is claimed, less effective than in the case of turrets, and under certain conditions it may even prove superior. On this question there may be room for discussion, but the next claim put forward for the disappearing system will hardly be disputed. When the site is favorable a practically complete invisibility of the gun emplacement can be obtained so long as the gun is not elevated. An armored fort necessarily presents a constantly visible mark, against which fire can at all times be directed, whether its guns are replying or not. The value of a masked battery for coast defense has always been recognized, but the difficulty of old was how to disguise the position so as to conceal its warlike character from the practised eye of the seamen, and once the deception had been exposed, there was always the fort or battery existing above ground to afford a mark upon which enemy could direct his fire. The interval between the discharge of very large guns must be great, and invisibility then becomes of additional advantage, a fact which was very prominently brought out by trials of the disappearing system made at Portland.

When the gun can be placed at some altitude the position is doubly advantageous, for not only is a greater command of fire secured but the gun is naturally less likely to suffer from the attack of the enemy. Sites for positions of this kind are usually not difficult to find, and enable the distinguishing characteristics of the disappearing system to be combined to the fullest extent.

The Italian Government have associated the disappearing carriage with the 11-in. rifled Armstrong howitzer, and the success obtained by this combination has no doubt largely influenced our own military authorities in adopting the mounting. A good many trials have been made in Italy with the howitzer and disappearing carriage. On the next page we give a diagram which shows the result of practice as obtained at the Elswick range by a few experimental rounds at different unknown distances. In this diagram the outline of a first-class battle-ship is shown in two positions, the area represented by its deck inclosing the spot aimed at in the practice. It will be seen how destructive the fire would be against a vessel at anchor and how much the difficulties of bombardment from sea would be increased by a few emplacements such as this. Far more elaborate experiments have been made at Spezia and elsewhere in Italy, but of the details we have no knowledge, although it is well known that the Italian authorities have every reason to be satisfied with the results; a very practical illustration of which is the large number of the heavy howitzers with Elswick carriages that they have provided for coast defense. In all these matters the Italians

show the greatest enterprise and activity, and the shores of the Italian peninsula promise to be the best protected of any power.

The application of the disappearing system to heavy guns has been the result of experience obtained at Elswick with lighter natures. It would, indeed, have been a bold man who would have ventured to predict that the monster ordnance of the present day would be placed on such carriages. The experience with the smaller guns at first tried was, however, always encouraging, and indeed, up to the present, there has been no break in the successful career of the system, as it has been extended to weapons of more weight and importance. In the design the same general features have been retained as those of the smaller calibres; although, of course, in detail, important modifications have been made as weight of gun increased.

The aim has been to supply a system of mounting in which a heavy gun can be worked without employing power or an excessive number of men. It was found by the installation of the Spezia defenses, that the power required to work heavy guns in turrets led to complication of mechanism, and a very great outlay of money. The value of being able to work by hand a weapon of such power as the 70-ton gun, at reasonable speed, was thus clearly demonstrated.

The work done in manipulating a gun is divided into the operations of training, elevating, opening and closing the breech, loading and supplying ammunition. By placing the whole mounting on a ring of live rollers, great ease of training is attained. Although the weights to be revolved in some cases approach 170 tons, four men are found sufficient to train the whole through half a circle in about a minnte and a half.

With regard to elevating, when the gun is down the gear can be set to any desired degree of inclination of bore without moving the gun. When the weapon rises it assumes the assigned elevation upon arriving at the firing position. For opening and closing the breech, the hand gear used is capable of applying great power, should greater force be necessary, or it can be quickly changed to afford rapidity of movement in those operations in which speed is of greater importance.

One round at five degrees depression was fired over the water. To find the path of the gun-muzzle a trough of clay was set up. The indication thus given showed that the arcs are gradually pulled up against the stops, on guides, arriving there after the muzzle had gone back five feet three inches, or just as it passed the edge of the shield.

The charge was about 100 lbs., shot 180 lbs., recoil 18 inches from the buffers, and the movement of the arcs just as described above; after that they ran to the bottom. On a subsequent occasion further rounds were fired.

The pressure found remaining from round No. 5 was 1,580 lbs. per square inch.—*Engineering, London.*

"MILITARY PROGRESS, 1888."

In Colonel Von Löbell's annual report upon the changes and progress in military matters during 1888, we note the following:*

INFANTRY TACTICS.

In Germany the series of new regulations, having for their object to bring the instruction of the Army up to the level of the latest developments in arms and in the tactics resulting from the introduction of them, was crowned by the publication on the 1st September, 1888, of the new infantry drill-book.

Comparisons between the new regulations and those they replaced have been published in many forms, as also in many languages. They show that the emendations and changes in the old regulations are very numerous, but beyond getting at this result the comparison is not of any great value. It will be sufficient to note here that the foundations on which the new regulations are based are: 1st, that the individual instruction of the recruits shall be as thorough and complete as it is practicable to make it; and, 2dly, that what is taught throughout shall be applicable to the battle-field. The enormous amount of experience gained during the War of 1870–71, the collation of which has become possible through the publication of numerous regimental histories, and the works of many able writers who took part in the campaign, has allowed of decisions being arrived at as to what formations and movements are absolutely impracticable under effective fire. All such have been either altogether omitted or reserved for use exclusively on formal parades, and the number so reserved has been reduced to a minimum. A reference to the summary already referred to in the note will show how completely this rule has been adhered to. The reasons for it are not far to seek. In the first place, with the shortened service, time is no longer available in which to teach men formations and movements which it is impracticable to use before the enemy without heavy losses being entailed. And, in the next place, experience shows that what soldiers have been taught in Peace, they will, in the excitement of the battle-field, naturally do; it is, therefore, of double importance to restrict the instruction to such points as will be required in War. One other very noticeable point is the absence from the new regulations of any normal formation for attack, and the absolute prohibition against any such being drawn up or practised.

In France, also, new regulations were issued for trial by the infantry, in May, 1888, but were found to be so impracticable that they were withdrawn. The spirit in which they were drawn up is evidenced by the fact that the five parts into which they were divided contained 766 pages, whereas the German Regulations contain 172.

The issue of new musketry regulations gave more satisfactory results. The number of rounds of ball ammunition to be fired yearly is, for the active army, 120; for reservists, 27; and for men of the territorial army, 20. The exercises are divided into individual firing, at which 88 rounds are fired at ranges up to 600 metres. The remainder, 32 rounds, are fired in six practices, in volleys, at 600, 800, and 1,000 metres, one practice being devoted to

* R. U. S. I. Journal No. 150, by Colonel H. Hildyard.

magazine volley firing (8 volleys in the minute); one practice at independent fire advancing from one position to another, from 600 to 500 metres; and one practice with rapid fire with the sight at 400 metres. In addition to this, 50 rounds are allotted to field firing, and are distributed as follows: two practices at unknown distances, under a non-commissioned officer; one practice in volley firing, under the commander of the sub-division: one practice as a company advancing to the attack from 800 to 200 metres; and one practice as a battalion advancing to the attack in the same way.

The 8th chapter, which deals with the rules for the control of fire, is the most important, and is based on the performances of the new Lebel magazine rifle. Fire control is carried out by units, which should not be larger than a half-company. The commanders of these regulate the beginning, the end, the interruption, and intensity of the fire, the object of which is to produce the greatest possible effect in the shortest possible time. Fire at long ranges seldom repays the expenditure of ammunition; when it is employed, a large number of rifles should be directed on the same object. The employment of fire is ruled by the consideration whether the engagement is of the nature of an attack, of a defensive action, or a rapid assault. In the attack, fire should be opened as late as possible, but then continued with the greatest possible energy and rapidity. As regards the application of the different kinds of fire, the battalion commander points out the object to be fired on, and, as far as possible, the portion of the enemy's line on which the fire is to be concentrated. The captains regulate the application of the fire and the expenditure of ammunition, and point out the object if this has not been done by the battalion commander. Half-company commanders and non-commissioned officers superintend the proper arrangement of the sights and the direction of the fire. Volleys are only to be fired by units not larger at the most than a half-company; rapid fire is only to be employed at decisive moments, and magazine fire only on the command of the officers. The distances are divided into: short (up to 600 metres); medium (600 to 1,200 metres); long (over 1,200 metres). Individual fire is only to be employed up to 300 metres against skirmishers covered or lying down, to 450 metres against single horsemen, 600 metres against groups of four or more men. Concentrated fire is recommended against objects of the breadth of a group up to extended columns and lines from 800 to 2,000 metres, being dependent in a great degree upon conditions of weather. Officers and non-commissioned officers are at the medium and long distances to observe the effect of the fire, and regulate the sights accordingly; in exceptional cases, where opinions regarding the distance differ as much as 200 metres, the sights may be set at several distances. As regards the vulnerability of the several formations, it is stated that the company in line begins to feel the effect of fire at 1,800 metres; the half-company columns and company columns at 2,000 metres; men kneeling are almost as easy to hit as standing up.

The Italian infantry also received in 1888 new musketry regulations, as a result of the introduction of the magazine rifle. As in the cases of France and of Austria during the past year, this issue of the new arm has entailed a material increase in the quantity of ball ammunition allowed for practice.

CAVALRY TACTICS.

No material changes took place during 1888 in the views already generally accepted in regard to the manner of employing cavalry in war. In the matter of equipment, the days of the cuirass are at an end except as a parade dress; and its use has been discontinued by the German cavalry. The lance, which had fallen into disrepute, and been entirely set aside by some European armies, is coming into favor again, and it seems likely to be established in the high place it formerly held. The question of giving the cavalry a repeating carbine has been freely discussed; but in France alone it was decided to arm the cavalry regiments with one, namely, with the Lebel repeating carbine (8 mm.).

In Germany increased importance was given to the use of the carbine by the publication of new musketry regulations for the cavalry. In these it is pointed out that instruction in firing is one of the most important portions of the training of cavalry, and must be carried out in all its parts with the greatest care. Whereas, formerly, special prominence was given to the training of the cavalry soldier at short distances, it is now prescribed that he is to be equally carefully trained throughout the three classes, for it is at longer distances that fire will ordinarily be possible. In field firing the manner of delivering the fire is restricted to groups and subdivisions; individual firing finds no place. Firing by groups is employed principally at short distances up to 500 metres; by subdivisions at medium and long distances.

The practical value of a more thorough training of cavalry in the use of the carbine was evidenced by an advanced guard exercise carried out over the Hagenau practice ground. A squadron formed part of the body of mixed troops employed, and was utilized dismounted, from time to time, to direct carbine fire against targets representing an enemy. The results were not altogether satisfactory, and gave occasion for the general commanding to point out that, though the employment of cavalry with their carbines dismounted would seldom occur, adequate training is indispensable if they are to avoid a check in such cases. The difficulties for the subdivision commanders in judging distances correctly in unknown and unexpected conditions, in quietly conducting the fire and maintaining fire discipline, are clear; constant practice is, therefore, required.

In Russia, judging from the dispositions made for the manœuvres, the theory regarding the employment of masses of cavalry, as mounted infantry, appears to have continued to lose ground. Great stress was laid upon the importance of cavalry being employed in concert with, or in opposition to, infantry in every manœuvre in which infantry took part. Night manœuvres were practised, and it is thought in Russia that in future wars they will play an important part.

In France the tactical training of the cavalry is seriously interfered with by the number of recruits, due to the short periods of service (generally 3½ to 4 years), and by a number of the remounts being unfit for the field. Including volunteers, each regiment has from 260 to 290 recruits each year; and, judging from the manœuvres, when the divisions were about 1,900 horses short, the regiments are still worse off in the matter of horses. In

these days, when training under service conditions is acknowledged to be of so much importance, French cavalry is placed by these circumstances in a very disadvantageous position as compared with the German.

FIELD ARTILLERY TACTICS.

The issue provisionally of new drill regulations for the Prussian Field Artillery in the spring of 1888 will no doubt be followed by the adoption generally of new regulations, the necessity for which has arisen throngh the changed conditions under which the arm is now employed in the field.

The principal tactical question under discussion has been the bearing on the employment and importance of field artillery fire, of the introduction of magazine arms. In an article in the German military review, "Mitheilungen über Gegenständes des Artillerie-und Geniewesens," this question is discussed by Captain Freiherr v. Stipsicz. He arrives at the conclusion that, seeing that it was already impracticable to attack a position held by infantry with ordinary single loaders without previous thorough preparation by artillery fire, the necessity for this will be enhanced in the case of the defenders being armed with repeaters. To insure this thorough preparation, he urges:

1st. The most extensive employment possible of the fire of artillery masses.

2d. That sufficient time be allowed in which to bombard the place at which the assault is to be made.

3d. The direction upon this and also on the reserves of a powerful fire.

4th. Immediate accompaniment of the attack, especially by those batteries that are masked by the infantry, up to 675 or 750 metres.

These principles for the employment of artillery must exercise an influence on the organization of the field artillery, for they will necessitate a strong corps artillery. The deductions drawn by the writer for the training of field artillery in Peace are three:

1st. The most important is its instruction in every phase of fire action; more attention must be paid to firing at long, even very long, ranges.

2d. The training in firing by masses must be attended to much more than hitherto.

3d. The great mobility and power of manœuvring of the artillery will form one of the most important factors in firing by masses.

With the exception of the increased importance given by the writer to practice at very long ranges, his views are no doubt practical and just. The necessity for a good and strong artillery to silence the fire of the enemy's guns, and to search out that portion to be attacked, and so increase the chances of success from the infantry attack, is still greater than it was before. He who remains the victor in the artillery engagement is apparently the victor in the battle.

The question of rapid communication in War continues to attract attention, and during the past year some interesting observations were made on the subject in France. From these it appears that 1 kilometre can be covered by a pigeon in 1 minute, by a hound in 2 minutes, by a bicycle or a mounted

man at a gallop in 3 minutes, and by the latter at a trot in 4 minutes. The establishment of the pigeon post on an extensive scale in Russia has already been referred to. In connection with the operations about Massowa, the Italians have made practical use of the pigeon post with excellent results. Communication is not only regularly maintained between the outlying posts and the chief station at Massowa, but reconnoitring patrols take with them pigeons in baskets, to enable them to communicate intelligence rapidly back to the station from which they were sent out. If a pigeon arrives back without having a message attached, and with some of its tail feathers pulled out, it is an intimation that the patrol has been surprised.

It appears, also, that in Italy a way has been found of maintaining balloons in the field, or before an invested fortress, for purposes of observation, without the encumbrance of a bulky train. Small balloons, suitable for one observer, have been constructed for the expeditionary corps in Africa, the necessary gas for their inflation being contained in an easily transported small, steel cylinder. The entire transport per balloon consists of three vehicles.

The same difficulty, namely, the necessity for a bulky train, is encountered in the application of the electric light for the purposes of fortress warfare. Experiments made in Austria showed that with three wagons a powerful light can be obtained and maintained, capable of being rapidly moved. Both in Germany and in Spain experiments were made in night operations, both the ground and the object being lighted up by the electric light. In the case of the Spanish trials, it was found that in individual firing under peace conditions the hits were as 74 by day to 33 by night; but in field firing under service conditions the results were about equal. The German experiments showed that those men within the sphere of light made better practice than those without it.

Great attention has been, and continues to be, paid to the employment of quick-firing guns in fortress warfare. In Germany, experiments conducted at Krupp's factory with these guns, varying in calibre from 4 to 13 cm., of which the two heaviest, namely, the 10.5 and 13-cm. guns, appeared the most suitable for fortress warfare. The time occupied in firing one round was four and five seconds respectively. Italy has adopted the 12 cm. Armstrong Q.F. gun for use in her navy, and also the 25 mm. Maxim machine gun.

In Part II. of the Report on Fortress Tactics, the question of the value of permanent fortresses and forts is discussed with reference to the theory advanced during the autumn of 1888, to the effect that, looking to the progress made by artillery, especially in the use of projectiles charged with high explosives, permanent works have lost their defensive value. The alternative suggested was the construction, as tactical considerations might dictate, of provisional earthworks, to be furnished with armored towers and shelters, made with the special view to their transport from place to place. In the report the fact is accepted that, in the field, attack and defense will be more and more a matter of position warfare, and so become more or less assimilated to fortress warfare. But the argument from this, that permanent fortresses and forts can be dispensed with, is combated. The inferences drawn from the experiences of the 1870–71 war are not to be depended upon,

for it is only since that war that the study of, and instruction in, fortress warfare have been seriously taken up. Had the French fortresses been defended with the knowledge and skill that have since been gained, the results might have been different. The existence of permanent fortifications does not prevent the construction, when tactical considerations require it, of strong provisional positions, as was done at Düppel, Plevna, Sebastopol, and frequently in the American War. The writer of the report, therefore, lays it down as his opinion:

1st. That a rational system of land defense will always be connected with such defenses as are already in existence, and will not experiment with extensive changes in the fortifications.

2d. That, looking to the value attributed to fortresses in all ages, it is not justifiable to introduce a new era of provisional fortifications, notwithstanding some examples in War which seem to favor these.

Comment and Criticism.

I.

"Fortifications and Fleets."*

Admiral David D. Porter, U. S. Navy.

I SEND you herewith a copy of a report I made to the Secretary of the Navy in July, 1887. I think this report is an answer to nearly all the points raised by Admiral Colomb.

The Admiral, like all British seamen, believes in the invincibility of the British fleet, and is willing to leave the defense of the country to that great armada which has up to the present time bid defiance to all the nations of the earth and will continue to do so while the descendants of the Norsemen retain that indomitable skill and courage, which has made them the foremost seamen of the world.

But, notwithstanding Admiral Colomb's idea, that the British fleet could be made sufficient to protect the coasts of Great Britain, you will notice by my report that the British people are spending millions upon millions in the construction of land defenses to prevent an enemy's fleet from entering their ports.

Forts are very much more valuable now than they were in former times. Up to 1875, the rule held good that almost any fort could be silenced by ships, provided the latter could approach near enough and were in sufficient numbers.

The whole system of warfare has now changed—there is at present no limit to the size of a rifled gun and no limit to the thickness of iron which can be put upon a Timbey turret, and the gun remains king over all the other implements of warfare.

There is no limit to the endurance of a properly constructed fort, while there is a limit to the endurance of an armor-clad and a limit to the size of the guns these formidable vessels can carry.

Our policy then should be to build the heaviest fortifications at every point likely to be assailed by an enemy, and I am satisfied that if the heaviest guns were placed in these forts no armor-clad would attempt to attack them, for if they did, they would meet with destruction.

In former times, ships carrying a hundred guns, would attack the old forts and in many cases the forts would have to succumb. No men could stand to their guns under a furious bombardment where grape, shrapnel and bursting shells swept everything before them. Witness the Battle of Copenhagen when Nelson with a part of the British fleet silenced the powerful land batteries; the French at St. Jean d'Acre; the English at Algiers and other places which might be mentioned, and finally the attack on Fort Fisher, one of the most formidable works ever constructed, which was silenced in an hour after the ships began the bombardment. All this was owing to the fact that the ships were able to *mob* the forts and keep the men from their guns.

Such a state of affairs cannot obtain under the system of fortifications proposed at

* *Fortifications and Fleets*, by Major Walker, R. E. Reprinted in JOURNAL, Nov., 1889.

the present day, where the heaviest guns on shore will be covered in by the Timbey system of turrets, or protected by earthworks plated with iron.

If you will observe, I exhibit in my report the same weakness for iron-clads as is shown by Admiral Colomb in his remarks about building up a great British fleet. This was because I wanted to use every argument to impress upon our people the importance of building a strong armor-clad navy, but I have given up all hopes in that direction and now rest my hopes on heavy fortifications armed with the largest class of guns.

There are at present five nations of Europe against whom we could not contend with any prospect of success, Great Britain, France, Germany, Russia and Italy. All these have powerful fleets and could enter our most important ports whenever they chose to do so.

The incapacity we have exhibited since we commenced to build an armor-clad navy in 1882, and the slow progress we have made, satisfies me we have learned nothing from the example of European nations. We have nothing that could protect our coasts from a foreign iron-clad and therefore, the sooner we go to work and construct coast defenses the sooner our safety and our honor will be assured.

You will notice that in my report I call our Navy the right arm of the national defense. I was then dreaming that we might some day have a navy approaching in power those of the nations of Europe, but that illusion has vanished and I see little prospect for our Navy until perhaps the coming century, when a hundred and fifty millions of people may demand that we have a navy not only to help defend our coasts, but to carry devastation abroad.

There is one strong point in favor of heavy forts. They will afford points of refuge for our iron-clads in case they are driven from the sea by a superior force. The combined forces of Army and Navy would prevent the enemy from following them up.

It is very foolish for men to argue solely in favor of their own branch of the Service, they should take into consideration what is wanted for the whole defense of the country. I therefore take the most liberal view and advocate defending all our harbors with the heaviest forts.

Foreign nations are all doing this to the greatest extent—all see the necessity of it, having been taught by experience—while we, resting under the delusion that no foreign foe will ever trouble us,—that our policy is one of peace—leave our coasts undefended against the most ordinary antagonist.

WASHINGTON, D. C., November 5th, 1889.

Lieut.-Colonel William R. King, Corps of Engineers, U. S. A.

The very able and interesting paper on "Fortifications and Fleets," by Major Walker, R. E., reprinted in the last number of your JOURNAL from the *Journal of the Royal United Service Institution*, is of especial interest to our Service at this time, and we may draw some valuable lessons from its study.

It is evident from this paper and from the papers and animated discussions preceding it, that our cousins—the sister services on the other side—have been entwining their fingers in each other's hair in a most unsisterly fashion, and, while we must avoid mixing in "family quarrels," we may from this safe distance inquire what it is all about and what bearing, if any, the discussion has upon our own services. This is how it began: While Parliament was discussing a loan of about $15,000,000 for forts, a proposition was made to cut down the naval estimates about $4,500,000. This was more than Admiral Colomb, R. N., could patiently endure, and he was constrained to "up anchor" and "sail in," which he did in a most vigorous style, with "two sheets in the wind," as it were, or perhaps more strictly speaking, the wind was in two sheets,

viz., the London *Times* and the *Journal of the R. U. S. Institution*. But, laying the figure aside, it must be admitted that the gallant admiral made a most powerful presentation of the navy side of the question, taking, however, for a text not the budget aforesaid, but an article on quick-firing guns, by Captain Stone, R. A., in which that officer had ventured too near the salt water.

This paper of Admiral Colomb was followed by exhaustive and thoroughly English discussion in the R. U. S. I. on two occasions, by some of the ablest representatives of the Army and Navy, as well as by distinguished civilians.

It is not proposed in this place to repeat much of these discussions, as most of those who are sufficiently interested in the subject to read this article have probably read the original discussions, and those who have not read them had better do so than to depend upon any abstract which could be given in this brief space.

Reduced to its simplest form, the contention of Admiral Colomb is that the Navy must be increased so as to take and hold the mastery of the sea against all comers, and, until this is done, no money whatever should be expended on fortifications. On the other hand, it is held that dock-yards, depots and coaling stations must be strongly fortified, and that it should be done at once, by strengthening the defenses already built and by adding others where they are most needed. It is interesting to note that all parties are agreed that some kind of defense, beyond what they now have, is necessary for the safety of the Empire; that the Navy is of first importance; that it is at present in a most unsatisfactory condition, and that forts are desirable in certain places, even in England, with all her naval power. Admiral Colomb, himself, was compelled to admit that, in his later arguments, but he stoutly maintained that the Navy needs no fortified base either for supplies, or as a place of refuge, in case of possible disaster, and he holds that if the Navy should lose control of the sea, England would immediately be starved into submission, as she obtains most of her provisions and raw materials from abroad. This, it must be admitted, is a strong argument, in fact, it is unquestionably his *strongest* argument, but we must note two exceptions, as the lawyers say, in passing.

First. The danger of starvation is not so great as would at first appear. The experience of blockade-running during our late War suggests that we have plenty of merchants and skippers who would like no better contract than to supply John Bull with his "roast beef," *for a reasonable compensation*, notwithstanding that his ports were blockaded, and even if our own country should be the unfortunate victim of his hostilities, I suspect there are some of the driving ones who would "turn an honest penny," in that way. Their consciences would not allow *so rich* an enemy to suffer.

Secondly. As to the bearing of the starvation argument on our own affairs, it need hardly be stated that we are in no danger of a famine, even if all the navies of the world should attempt to blockade our ports. An effective blockade of five or six thousand miles of sea-coast would be a task that no single nation is likely to undertake.

Major Walker points out the visionary nature of Admiral Colomb's proposition to make the Royal Navy supreme in all parts of the earth, and shows beyond question the necessity for permanent works to defend harbors, dock-yards and coaling stations. Without attempting to follow out his line of argument, we may note that in 1810, England had 664 armed cruisers at sea, but in 1887 she had only 106 in commission and 23 more ready for sea; but, according to Admiral Hornby, there were only 37 effectives out of the whole lot. This shows what a vast amount of work is required to bring the Royal Navy up to Admiral Colomb's standard, and how vastly *more* difficult it would be to bring *our* Navy up to such a standard that it could contest the supremacy of the sea with the English Navy. Of course, there can be but *one* "Mistress of the Seas," and according to Admiral Colomb, in fact, according to com-

mon sense, a navy must be at least equal to its antagonist in order to be able to defend itself, to say nothing of defending the sea-coast of a continent.

But this is not all. We do not admit that even a navy that is "Mistress of the Seas" can be safely trusted to defend the vast interests exposed to capture along our sea-board. Divide such a navy, however large, among our twenty odd important seaports and the enemy could take them in detail. Admiral Colomb's idea that a fleet can protect a harbor 700 miles distant is the most transparent moonshine. It is a singular fact that the same number of the *Journal R. U. S. I.*, which contains this remarkable proposition, and supports it with the statement that the French fleet under Admiral Bouët dared not attack Colberg because there was a German fleet 700 miles away, contains also a French report of the campaign of 1870 in the North Sea and Baltic, translated by Admiral Colomb himself, showing conclusively that the German fleet had nothing whatever to do with Admiral Bouët's decision not to bombard Colberg and other German cities.

But there are many other reasons why fleets cannot be trusted to defend cities, dock-yards, etc., among which may be mentioned the enormous cost of mounting guns on ship-board as compared with the mounting of doubly efficient, and more than doubly protected, guns on shore, a very plain illustration of which is the fact that a cruiser only partially covered with armor and carrying only say 10 guns of moderate calibre costs $2,500,000, or $250,000 per gun, while the same expenditure will easily mount 100 guns and mortars in secure batteries on shore.

Without going into the details I am prepared to show by actual estimate that this is a very safe comparison. It is well to bear in mind that the forts at Spithead, Plymouth and Dover are not by any means as antiquated as some people appear to imagine. Major Walker states, as other engineers have stated heretofore, that these works can easily be brought up to date by increasing the thickness of the armor plating, and that provisions were in many cases made for this in the original construction.

As an illustration of how much more durable forts are than ships, and how much easier they are to modernize, I may state that the masonry fort at Willet's Point, which was partially built twenty-five years ago, and which has been left in an unfinished state ever since, could be protected with steel and concrete so as to make it as secure against the most formidable projectiles of the present day as it was when designed against the projectiles then in use, and that this would not cost more than 65 or 70 per cent. of the amount already expended on the work, or say $17,000 per gun, as the fort will mount about forty 10-in. rifles.

Where is the ship of twenty-five years ago that could be brought up to date by any such expenditure?

With one more illustration of Admiral Colomb's absurdity I will close this already extended paper. The great advantage claimed for a fleet in coast defense on account of its mobility is an argument in exactly the opposite direction. What would have become of Samoa if its defense had depended on our our fleet, which was almost annihilated in a single storm? And of what value was the fleet in Hampton Roads in coast defense when the *Merrimac*, single handed, practically destroyed it in a few hours? Plenty of instances of the fleet's being in the wrong place when urgently wanted could be given, but I will only mention one case which came under my own observation and which is of sufficient importance to be noticed on its own account. I refer to the time when General Grant's base of supplies at City Point and the supplies for the Army of the James at Jones' Landing depending upon the James River fleet for their protection against an attack by water were saved from destruction by the narrowest chance.

Most of the fleet had gone on the Fort Fisher expedition, leaving one double tur-

retted monitor and a torpedo boat to watch the Confederate ironclads lying in the river above Dutch Gap. Taking advantage of the situation these ironclads, the *Richmond, Jamestown, et als.*, came down one night and came very near clearing out the entire river. The only thing that prevented, so far as I have ever been able to learn, being the fact that one of the smaller vessels was sunk by a mortar shell, from a shore battery, and another ran aground in trying to pass the obstructions in Trent Reach. The expedition was then abandoned and before it was renewed additional vessels were telegraphed for by General Grant and shore batteries were built mounting heavier guns, to guard against a repetition of the attack. That the danger was imminent no one could doubt; orders were given to sink any or all of the supply vessels and barges lying at Jones' Landing in the draw of a pile-bridge we were then building, and bales of hay were turnnd into hasty shelter for riflemen who, it was hoped, might pick off the crew of the ironclads through the conning holes in the armor. At General Grant's headquarters, at City Point, where the entire reserve of ordnance and commissary stores were stored, a couple of siege guns were hastily put in position on the bluff, from which it was hoped a lucky shot might damage the ironclads should they come down and undertake to sink the fleet of transports moored at the wharfs and anchored in the river.

Thus we see that the *mobility* of a navy may enable it to be at the *wrong* place when most needed; and in like manner the power of *floating* involves the possibility of *sinking*, either from storms, rocks, or torpedoes, or still worse from collisions with each other, which, even in cases of friendly evolutions of the Royal Navy, have caused serious damage to quite a number of ships. Forts may rejoice that they *do not float*.

WILLET'S POINT, N. Y. H., Nov. 30, 1889.

Capt. W. J. Sampson, U. S. Navy.

The relative efficiency of forts and ships for the defense of a coast depends upon the kind of defense which is contemplated.

If it is desired to protect a locality from capture or destruction by a naval force, this can best be done by fortifications, provided they can be properly placed. If they can be placed so far in advance of the locality to be defended as to render it impossible that the guns of a fleet shall reach the locality in question without coming within destructive range of the guns of the forts, then the forts will furnish complete protection. And in the future the great support which forts will receive from submarine mines will make a given defense by forts more efficient than it has ever been before. If a locality is properly defended by both guns and submarine mines, I think it will be in rare cases only that a fleet will attempt to force a passage. If, however, the forts cannot be given such an advanced position, or if they cannot be assisted by submarine mines, then, in such cases, I think, forts will not furnish the requisite protection. Doubtless there are instances where a fleet which has passed the outer fortifications may still be kept under fire; but the projectiles then intended for the enemy may reach friends instead. The great increase in the power of guns has given an enormous advantage to the ship; not in overcoming the fort, but in overreaching it. A city or a dock-yard furnishes a large target—*fixed in position*. It can, though unseen, be aimed at from the sea on a dark night, or during a dense fog. The guns can be aimed from compass bearing, and at such long ranges. This will probably be done in all conditions of weather. While though the guns on shore may be more accurately pointed, and the distance be known with all the precision furnished by modern appliances, yet the ship will always remain a small target, and even that will be frequently obscured. If, however, such a defense of the coast is desired as will render it impossible for an enemy to molest it, forts alone are not sufficient even under the most favorable circumstances. Forts are efficient only at

the points they are constructed to protect, and their moral influence extends scarcely beyond the range of their guns. They cannot prevent blockade, and just here is the vital point. The disastrous consequences of a blockade to a commercial nation would be far greater than those of a bombardment.

It was doubtless the intention of the Council of the Military Service Institution in reprinting the paper of Major Walker, R. E., to draw some lessons, useful to our own country, from the arguments and suggestions contained in the paper. Our isolated position as regards other powerful nations is a source of security which Major Walker declares does not belong to the insular position of Great Britain. The controversy which has been in progress for some time in that country, as to the importance of ships and forts for defense of the kingdom, cannot be supposed to settle the question for us even were it decided for her. The conditions are totally different. England has colonies scattered all over the world, and only a navy can protect them. She is separated from several possible enemies by a narrow strip of water, which she must patrol with her mighty fleet to prevent those enemies from crossing. Although the demands upon the services of that fleet come from all parts of the world, it may readily be seen that its existence renders forts less necessary than they would be without the fleet. We have no colonies, our neighbors are 3,000 miles away, except those who have colonies, or coaling stations near our coast, which practically brings them to the same distance, so far as naval operations are concerned.

It is hardly necessary to mention to members of the Military Service Institution that this country, in case of a foreign war, would probably have to defend herself only against a naval attack ; and unless we are able to destroy any bases of supply near our coast which our enemy may possess, we shall certainly in the final result come off second best. The importance of this consideration can scarcely be overestimated in reaching a conclusion as to the character of the defenses required by this country. If our enemy cannot transport an army to our shores, which I believe to be the case and, if as I also believe, no prolonged or serious naval attack can be made upon us by any nation which has not bases of supply of both coal and ammunition near at hand, then it would seem to be vitally important to be able to destroy such bases upon the first outbreak of War. We must then have the naval strength to accomplish this object ; with less than this our ships would be forced to seek protection in our own ports and would remain there blockaded. Under such circumstances, forts might protect our cities from capture or destruction, but they could not change the final result. Our commerce would be destroyed, and its attendant evils would reach every home and industry in the land. This country must possess a navy sufficiently powerful to capture or render useless every base of supplies, possessed by an enemy, which is near our coast. With the enemy's base thus pushed back two or three thousand miles we shall have comparatively little to fear from her powerful armor-clads.

It would therefore appear that the question of the relative efficiency of forts and ships in furnishing a defense for the coast cannot be decided for us or any other nation without a comprehensive examination of all the conditions in each case. The functions of forts and ships considered in the abstract are totally different ; although ships, because of their mobility, have a broader scope of usefulness than forts. So far as forts will furnish the defense required, they are much to be preferred to ships. They are cheaper, more durable, and always ready. The fact should not be lost sight of, however, that while forts may be able to resist any attack, they may not completely protect the locality, and in no case can prevent a blockade. It therefore follows that, in the first case, a naval force should supplement the forts, and, in the second case, the naval force should be sufficient to prevent a blockade, even without the momentary suppor of the forts.

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For these purposes it is not necessary that the ships should be always present. An enemy's fleet cannot bombard a city without due warning ; and a blockade, to be injurious, must be of some duration, and the injury increases more rapidly than the duration. Therefore, if the fortifications are sufficient to resist the attacks of the enemy for even a short time, and the naval force is sufficient, and can come to the assistance of the forts within this time, we shall have a perfect defense.

If the assumption be correct that in case of War the Navy should be strong enough to destroy all bases of supply near our coast belonging to the enemy, then the strength required for this purpose would be sufficient to prevent the blockade of any port on our coast, East, West or South ; and therefore our fortifications need not be extensive.

If we start with the reverse assumption, namely, that our fortifications should defend all important points of the coast, independently of the Navy, then, I think, we would be wasting our energy in unnecessary defense, and if the Navy were not at the same time up to the strength above indicated, we should fail in the most important feature of defense—in preventing blockade and in protecting our commerce.

Lieut.-Col. S. M. Mansfield, Corps of Engr's, U. S. A.

A perusal of Major Walker's paper on "Fortifications and Fleets," reprinted in the November number of the JOURNAL OF THE MILITARY SERVICE INSTITUTION, suggests some erroneous opinions prevailing in the United States regarding coast defense. To what extent they are held I will not attempt to say, but that they do exist, there can be but little doubt.

The question of reliance upon vessels of war, floating batteries and gunboats as temporary substitutes for permanent fortifications in the defense of the sea-coast has received attention from able military men and statesmen in this country, especially during the past thirty years, or, since the application of steam to vessels of war. Arguments have been advanced, *pro* and *con*, with great force, and the whole subject has been discussed in all its bearings, with the verdict decidedly in favor of permanent land works as the leading feature of any system. The great activity witnessed in all European countries in such works, as well as in naval matters, should put the question at rest and relieve any thinking mind of doubt as to the necessity of permanent fortifications for coast protection. Notwithstanding all this, it is surprising to be told by one high in authority, in substance, that, with a superior navy at the outbreak of War, coast fortifications are of little value. Major Walker's paper, in reply thereto, is an admirable defense of permanent works, and I cannot be expected to shed new light on this question, which he has so exhaustively treated. What I had in mind to call attention to, is the feeling, that I believe still exists to a considerable extent in this country, that sea-coast fortifications are unnecessary, and that the establishment of a powerful navy is all that will be needed to protect our coast from invasion. Our present progress in naval matters, our sending of an imposing squadron to fly our flag in foreign waters, will, doubtless, lend encouragement to this belief. We may be pardoned a just pride in our latest naval achievements, a desire to show to the world what we are capable of in the way of ship-building, but it is to be hoped that the projected system of permanent fortifications for our principal sea-ports will not be entirely lost sight of, and that a beginning will soon be made in the construction of these works, in which we are now sadly deficient, and which appear to be so necessary to secure our position as one of the foremost nations of the earth.

It is idle to suppose that we shall ever possess a navy capable of performing this function of coast defense in addition to its duty of affording protection to our commerce, security to the lives and property of our citizens abroad, and of upholding our national honor in foreign lands. To employ the Navy, if we had one, in the place of

a system of permanent works would be to substitute chance for certainty; the chance of being surprised without defense through the many accidents to which a navy is peculiarly liable, against the certainty, of land defenses always ready. England is to-day more powerful on the sea than ever before, she is the acknowledged mistress of the ocean, yet she is constantly strengthening and adding to her land defenses, thus showing that her reliance is not alone upon her navy. It would seem as if any doubt of the wisdom of this policy ought to be dispelled since the recent naval manœuvres on her coast. With such an example to guide us, we ought not to hesitate. It would be simply impossible for the United States to create a navy and maintain it in that condition of efficiency that it could be relied upon to protect our extensive and disconnected sea-board, hence, we should prepare the means of defense that clearly lie within our ability to acquire and maintain in perfect efficiency.

Another mistaken notion, and one quite prevalent, is that our present fortifications are useless and will serve no purpose whatever as a defense against modern ironclad ships, that they will have to be removed to make way for new structures, or be abandoned altogether. This view is entirely wrong. If we had no such works, their sites, or those which were deemed advantageous, would no doubt be occupied by works of a very different character, but it is believed that but few, if any of them, will be discarded as useless, or be in the way of new works.

Under the present approved scheme of coast defense, they would be incorporated with it and become an important factor. We shall not build any more of the elaborate and expensive masonry castles characteristic of our *ante bellum* days, but will discard masonry wherever possible, and mount modern artillery of increased range behind suitable earthworks on disappearing carriages, or in pits, with bomb-proof cover for magazines, or in iron turrets and behind shields, when earth works are impracticable; using a fewer number of guns, but of higher power, and distribute instead of concentrating them as before. We will occupy stations to command a more extensive field, and make it impossible for a hostile fleet to approach near enough to reach with its fire the cities, navy-yards or depots, that are the object of attack. Our present works, generally, are not sufficiently advanced for this purpose, to say nothing of their inability to hold out against modern ordnance on war-ships of the present day, but they will serve to cover the channels of approach in connection with mines and torpedo devices, which are a most prominent feature of our new system.

It is the duty of the Government to afford adequate protection to our sea-coast, by providing fortifications which will exclude an enemy's fleet from entrance to our harbors, and render them available for our own vessels while preparing for operations on the ocean.

Our defense includes fortifications and fleets; both are indispensable to a perfect defense, and each has its place in the new and approved system of to-day.

Our Navy is now being placed upon a substantial footing, but the requirements of permanent land defenses must not be overlooked, so that their construction will be long delayed, for a Declaration of War against us, would be immediately followed by the presence of a powerful fleet off some one or more of our principal ports and we would be powerless to oppose it.

BOSTON, MASS., Nov. 20, 1889.

Lieut. Bradley A. Fiske, U. S. Navy.

In case we were called upon to decide whether our coast should be defended wholly by forts or wholly by ships, we might remain long undecided which to employ; but we are not—and shall not be—called upon to decide anything of the sort. The country

being willing to expend a given sum to defend its coast, the question is, How shall this sum be apportioned?

It would seem as if Major Walker had epitomized the whole subject in the sentence: "A satisfactory defense of the Empire can only be obtained by a just combination of all the elements of defensive strength—ships, forts, material obstacles, organization of men." For Great Britain, he admits that ships are the most important factor; and he further admits that if a navy is sufficiently stronger than the enemy's navy, then fortifications need not exist, but he follows this admission by showing how uneconomical it would be to make a navy strong enough to do do its own proper work and the work of land defenses also. And the opinion of a board of British admirals supports him. When the Achill squadron broke the blockade at Bantry Bay last year, Admiral Fitzroy with the *Rodney*, *Warspite*, *Iris* and *Severn*, made a sham raid on the enemy's coast. At Aberdeen the estimated damage supposed to be done was £400,000; at Edinburgh, £1,000,000; at Shields, £500,000; at Newcastle, £1,000,000; at Sunderland, £1,000,000; at Hartlepool, £500,000; at Scarborough, £500,000, and at Grimbsy, £500,000, all in two days. This was almost in the presence of a hostile fleet from which they had just escaped, and the board of admirals remark in their report: "It is unnecessary to point out the incalculable mischief which so enterprising an enemy might inflict in even that short time, and how imperative it is to complete the military defenses of our great commercial centres without further delay."

On our long coast, with its wealthy cities lying invitingly open to the swift and powerfully armed cruisers of the European powers, the necessity for forts is so absolute and so clear that it seems absurd to urge it. Equally is a fleet necessary, since it is obviously impossible at any reasonable cost to fortify all our harbors impregnably. It would seem as if all ends were best served by fortifying our principal cities to such a degree as to enable them to defy, unassisted, any attack, except a determined onslaught by a large fleet, and to resist even such an onslaught until the arrival of the coast defending fleet; and this fleet should be powerful enough to overcome any enemy's fleet under these circumstances. It need not be said, the larger the fleet the better; but the above is intended to indicate the *minimum power* our coast fleet should possess.

What the precise balance should be between ships and forts, how much should be spent on one, and how much on the other, is perhaps as difficult a thing to decide as can well be imagined. But one thing no one will deny, and that is that both the sea and the land defenses should act together as two parts of one force, and that the system of signalling and all the means of communication between them should be the subjects of deliberate planning and unremitting care. In the English naval manœuvres last year: "The work done by the coast-guard signal stations in transmitting intelligence was most valuable. * * * The necessity for making the signal stations around the coast accessories of the naval defense was fully presented by the manœuvres. Both Admiral Baird and Admiral Tryon were entirely dependent for a time upon the information thus furnished."

It need hardly be pointed out that the worst thing which could arise is one that, unfortunately, has often arisen ere this, a foolish jealousy between the two branches of the Service. It is claimed that one of the many reasons for the admirable discipline of the German Army is the absence of jealousy between commanders and between different branches of the organization, and the wonderful enthusiasm with which all work together for Fatherland. Doubtless this spirit—this generous spirit—will do more than any other one thing to bring us to the correct solution as to the proper balance between Fortifications and Fleets. And let us avoid half measures. Let us have forts equipped with every device that science can suggest and money buy; and let us not be content with pretty cruisers whose best point is the speed with which they can run away,

but let us insist on powerful battle-ships capable of seizing a desirable position and maintaining it. Who can tell what would have happened had we not had, on a certain bright Sunday morning at Hampton Roads, a little *Monitor* capable of doing just this thing?

HOTEL BERESFORD, NEW YORK, Nov. 29, 1889.

Capt. John G. D. Knight, Corps of Engr's, U. S. A.

In the November number of this JOURNAL, was reprinted an article written for English readers, but worthy of our own attention. "Fortifications and Fleets," by Major G. R. Walker, R. E., which originally appeared in the *Journal of the Royal United Service Institution*, with a few modifications, would have passed for a study of the question made on this side of the Atlantic. Here, as well as in England, many are apt to consider the sea alone as a sufficient defense; others, that we are "peaceful traders, loving justice and mercy," though we may not all be prepared to also love "free trade." Another class, however, exists with us alone: a class confident that the inventive genius of an Ericsson will always be able to rescue us from a threatening *Merrimac;* a class unmindful that wars are begun and ended in less time than was required for the construction of a *Monitor;* unmindful that the contract time for building the dynamite cruiser *Vesuvius* was twelve months; that the contract for building the cruiser *Baltimore*, which has just made her second trial trip, was executed December 17, 1886; that torpedo cable is not an article which manufacturers keep in stock.

Major Walker first takes up in detail, six propositions advanced by Admiral Colomb, by which the Admiral desires to establish that its superior Navy is a sufficient defense of the coasts of the British Empire. One of these propositions favors our construction of coast defenses, inasmuch as the Admiral admits therein that land forts are useful to the inferior naval power. Another holds that enterprise against an enemy's territory or fortresses, must always be abandoned if there is the least chance of the loss of command at sea. The Bantry Bay, and succeeding manœuvres of August, 1888, did not substantiate this. Then two divisions, blockaded by two other divisions of two squadrons, not only escaped, but also eluded their pursuers, and caused mimic havoc on commerce, and in ports of the north of England and of Scotland. The comment of the *Illustrated London News*, was: "It is now quite evident that our great commercial ports, the Mersey, the Clyde, the Tyne, and the Humber, and all the shores of North Britain lie at the mercy of a naval enemy passing westward of Ireland and from the Atlantic to the North Sea."

The contention of the Admiral that fortifications have never resisted a determined attack by troops landed from ships, warns us of the possibility of such an attack. This must be resisted by land forces, and while it is not admitted that an enemy can, sooner than ourselves, concentrate a superior land force at any fortified point of our coast, we must bear in mind the aid which steam lends to rapid approach and speedy landing.

With Major Walker we agree that the most hazardous statement of Admiral Colomb, is his endeavor to establish the superior economy of ships over landworks because of the greater durability of the former. The claim is not one of relative perishability of materials; but of durability of the systems employed. From 1816 to 1860, we have had but one system of coast defenses: then rifled guns and armor plating necessitated a change. This change was in progress when suspended by lack of appropriations; and will be continued on substantially the same lines when appropriations are again made. Have changes in naval systems been less frequent? We should not infer that they have. A monitor is being converted into a battle-ship; the Austrian battle-ship *Lissa*, built in 1869, is now declared obsolete: our *Juniata* and *Quinnebaug*, the one

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built in the early days of our last War, the other completed in 1877, are the latest addition to the "condemned list;" a recent wail from France is that two armor-clad fleets built in less than forty years no longer answer their requirements, and to-day a third is being outlined, in advance of all maritime powers, but with the prospect of being rapidly surpassed. Nor can the superior economy be shown when actual cost is considered. No one will contend that twenty-five modern 1st class war-vessels ready for service, if tied to our coast, could defend it throughout its entire extent; yet they would cost as much as all our proposed defenses of lake, gulf and ocean coasts, with armament complete; thirty-five cruisers, like the *Maine*, without their armaments, as much as these defenses in like condition; three such vessels, without their armaments, more than all the proposed mortar batteries, completely equipped, capable of making highly dangerous the anchoring of war vessels within a range of five and a half miles, while the mortars themselves could hardly be injured.

The general questions of ships, or fortifications for the coast defense of America was considered in 1851, when several officers of our Navy reported their opinions on three points relating to coast defenses, of which one was: "What reliance could be placed on vessels-of-war, or of commerce, floating batteries, gunboats, and other temporary substitutes for permanent fortifications." The officers were Commodores Morris and Perry, Commanders Cunningham and Dupont, Lieutenants Lanman, Maury and Dahlgren. Not one of them considered that substitutes could be had for permanent works. Commodore Morris wrote that no safe reliance could be placed on these substitutes, unless they should be multiplied to an extent requiring an expenditure unreasonably great, and much greater than would give equal security by a judicious combination of permanent fortifications and a floating force; Commodore Perry stated that it would be unwise to neglect a reasonable system of permanent defenses upon the coast. Lieutenant Dahlgren well said, that the ship and the fort have each a particular province in every general system of well regulated national defense.

Thirty-five years later, in 1886, Commander W. T. Sampson writes: "If the Navy proper is held for coast defense, then other important duties must be largely neglected, and some of the most efficient means of bringing the enemy to terms be disregarded. A naval force which is adapted to the wide range of its duties is not adapted to the work of defending a coast." His words were verified two years later, by the August, 1888, naval manœuvres already mentioned.

Admiral Colomb finds no support in the example of France, which to-day has 283 forts, or batteries for coast defense, notwithstanding its fleet of more than 100 armor-clads and cruisers, and fully twice this number of torpedo, gun and dispatch-boats.

Leaving this discussion, Major Walker, touching upon the location of coast defenses, gives greater prominence to points favorable to landing an invading force, and to military ports, than to commercial ports. For us, the reverse order is the more suitable; our commercial ports would probably first receive the attention of an enemy, their wealth alone marking them as a prize to be coveted; next, our navy-yards.

A rough, brief classification of works of coast defense follows. Three classes are given, and it is a satisfaction to read that of the three, the one which is now most in favor in Great Britain, is the one to which our military engineers gave great attention twenty years ago. We read that "every emplacement now being built throughout the Empire, is of this class:"—earthen *barbette* batteries. Both for guns and mortars, this class promises good results at small cost.

Paying some attention to the land fronts of coast defenses, and to the personnel of garrisons, Major Walker closes with a reference to John Bull, as fond of boasting that he is a peaceful trader. This recalls the growing danger threatening us in this very character of a trader. In the November, 1889, number of *Scribner's Magazine*, J.

Russell Soley considers the effect on American commerce of an Anglo-Continental War, and clearly shows that "in its character of a commercial neutral, with an immense export trade, it [this country] is sure to find itself a mark for encroachments and aggressions." Once let provisions be declared contraband of war, a declaration by no means improbable, and the declaration enforced "means the collapse of our foreign market." He may well close with the warning contained in the same article that so long as our sea-coast cities and maritime interests remain unprotected as at present, our population, area, credit, wealth, and all other elements of potential strength, will serve but little purpose in securing a respectful hearing from belligerent aggressors.

II.

"Military and Naval Pensions of the United States."

Gen. Horatio C. King, late N. G., S. N. Y.

I DON'T think I can add very much to the information which is contained in General Howard's admirable paper,* but I am impelled by the importance of the subject to respond to your call to open the discussion.

I feel, and I am sure you all do, that this is the proper place and occasion to voice the sentiments of many veterans in regard to the pension question. It seems to me, too, that it is high time the general public as well as veterans should take an active interest in this matter.

Now there can be no question, I am sure, in respect to the generosity of this Government. It can hardly be said of the United States, as it has been said of some nations of Europe, that:

> "When the soldier asked for bread,
> They waited till he was dead,
> And gave him a stone instead,
> Sixty and one feet high."

In 1871, six years after the close of the War, when it would naturally be supposed that every invalid, widow, orphan, or dependent had filed their claims for pensions, the entire appropriation for pensions, in round numbers, was $34,500,000. In 1875 there was a reduction to $29,500,000; in 1876, $28,250,000, nearly a million less; in 1877, 12 years after the War, the pension appropriation was reduced to $27,100,000. Then by organized effort, instigated and stimulated by claim agents in 1878, Congress increased the amount to $35,000,000, nearly eight millions gain. In 1880, stimulated by the success of former years, the agents went to work and secured an increase of seven millions, and now in 1889, twenty-four years after the War, instead of a decrease, which there naturally should be, the amount of pension appropriation is $88,275,113.06, an amount equal to the total expenses of the Government immediately before the War, and I understand that on account of numerous re-ratings, the appropriation for this year will reach at least $100,000,000. Let me say here also that the arrears of pensions which it was asserted would not exceed forty millions of dollars, have actually reached $200,000,000, and there are on file, I am informed, unsettled claims calling for two hundred million more.

I realize very well that it is a very unpopular thing for any man to speak against, or antagonize in any way, this constant increase of pensions. He is warned by political workers that if he desires the votes of the old soldiers he must help to keep it up; to give every comrade, widow, minor or dependent person large pensions. Yet, as a soldier in the War, I think that it is about time to cry a halt, and endeavor to see that the generosity of the people shall not be overstrained or abused.

* See page 1.

Now, one of the bills before Congress is a per-diem bill, which has many conscientious supporters, and another which is known as the dependent or pauper pension bill. The per-diem bill proposes in substance that one cent per day shall be allowed for every day's service ; that is, if a man served one year his pension shall be $3.65 per month, and so on.

I suppose that no one can give even an approximate estimate of the number of survivors of the War, but there are certainly not less than 1,200,000.

I am not very good at figures, but any one can see that at one cent per day, future administrations would be relieved of any consideration of that embarrassing problem, "How to get rid of the surplus?" The pauper pension bill has in it some excellent provisions provided they can be honestly executed, so as to reach the really needy and deserving.

It is easy to excite public sympathy, especially upon the stump, by declaring that no old soldier should be allowed to suffer. And I agree with that sentiment ; but the Government should see that the class of men who make no effort to care for themselves shall be cared for by a paternal hand, and not by ill-considered bounty. As one sows so one reaps. If men have, by vicious habit, sapped their vitality and brought themselves to extreme poverty, I question very much whether it is wise for the Government to pay out large pensions to such. But I do say, most earnestly and emphatically, that no indigent old soldier should be permitted to go to the poor-house, even though his ills are of his own making. We want no poor-house for old soldiers. We want more Homes. General McMahon, the Secretary of the Board of Commissioners of Soldiers' Homes, surprised me the other day by telling me there were already more than four hundred men in the Homes in excess of their prescribed capacity, and because of the limit prescribed by law, many applicants have to be refused admission. Congress should promptly provide more Homes, with ample provision for the comfort and enjoyment of those who cannot take care of themselves.

There is one way to reach men of this kind ; and that is, in the next census it should be provided that every census-taker shall furnish every old soldier a blank on which he could write out his complete record, history and condition ; such a record would also be a most valuable aid in the proof and payment of unsettled claims of which many thousand are suspended because of defective evidence.

I have been told that there are 475,000 unsettled cases now on file in the Pension Office, and 28,000 still unexamined. This may come from an insufficient number of clerks, or from a rule that requires the evidence of disability to be made by one commissioned officer, or two enlisted men. Well, I don't know but that at this period, almost twenty-five years after the close of the War, the evidence of one enlisted man is not as good as that of a commissioned officer. But anyway, for want of such evidence, thousands of pension claimants are dying off, bereft of the aid which their necessities demand and to which many are doubtess entitled. Now, if there are not clerks enough then more money should be voted to secure sufficient clerical force to pass promptly upon all claims, and stop, what I regard, a disgraceful condition of affairs.

What I have said is entirely unpremeditated. My figures were used in former remarks and are fresh in my memory. I want to say this, before I close, that I do not think this matter should be left to whims, caprices and avarice of lobbyists, and I do not like to have old soldiers imposed upon by such people, who use their influence in securing improper legislation.

As to a service pension as a reward of merit, I am inclined to think the needs of the bulk of the veterans do not at present require, nor are they standing hat in hand begging for, it. At the proper time this recognition will be made—but following the long established precedent, it will be when the average age shall be about sixty.

XUM

I hope this discussion will invite a thorough sifting of the matter, throughout the land, and that the voice of the old soldiers shall be freely and fully heard.

Maj.-Gen. O. O. Howard, U. S. A.

I want to say that there is an enormous list of unsettled claims which, owing to the lack of sufficient evidence, are gradually increasing in number; and that it will take, to settle the just claims, an enormous appropriation. It would have been so, particularly if the re-rating that was started had continued.

In view of these facts, I am afraid we may lose our pension list altogether if we are too greedy. I do not think it wise to endanger our present status.

The country at large sees how thoroughly the Grand Army work is done. It is growing, and no worthy soldier will come to the "poor-house."

I think we are so circumstanced as to wait and see whether Congress will not grant some wholesome pension act, as in the case of the Revolutionary pensioners, thirty-five years after the Revolution, or better, fifty-seven years after the War of 1812.

If we begin a *Service Pension* fifty years after the War of the Rebellion it will be in ample time.

It is not long, in my eyes, to *1915*, the Jubilee year.

Gen. Egbert L. Viele, U. S. V.

The admirable paper of General Howard has many points of special interest, besides being a resumé and clear analysis of the pension system from its first inception to the present time, and it will undoubtedly afford a great deal of information to those whose duties require them to deal with this subject. There is an unquestionable necessity for a complete and careful codification of the pension laws, so as to avoid the complicated rulings that have in the past created so much confusion and dissatisfaction, not to say injustice. That an undue advantage has been, in the past and is in the present being, taken of the generous impulses of the Nation to secure, by fraud and misrepresentation, money from the Treasury for the undeserving is evident to any one who has taken pains to examine into the methods by which pensions are obtained; while on the other hand many meritorious cases have failed to meet with justice. The question is, how to obviate fraud and how to secure justice? In the first place, there is a class of men known as claim agents, who are supposed to be a necessary evil, and old soldiers are led to believe that they and they alone can secure their just dues, while many unworthy persons seek their aid to obtain what is not justly due them. It would seem to be a wise policy for the Government to employ competent persons to receive the statements of those who think they are entitled to pensions, and to embody these statements in the proper forms of applications. A bureau especially charged with this duty, under an officer of the Adjutant General's Department, would certainly act as a barrier against fraudulent claims, would save to the Government many times its cost while saving to the soldier all the expense now exacted by the claim agent. I have had something to do with pension legislation, as a member of Congress, and I saw enough of the workings of the system to convince me that there was great room for improvement. Having introduced a bill in Congress and secured its passage granting a service pension to the survivors of the Mexican War, I was greatly surprised, after I had myself, in course of time, become entitled to this honorable distinction, to receive a notice from a claim agent in Washington that *he* had secured the passage of the law and demanding compensation from me as a beneficiary.

I agree with General Howard that a Commission should be appointed to take up the whole subject of pensions, with a view to secure a clearly defined policy, free from doubt and subterfuge, and equitable in all its provisions. I think the General has done

a great service, to all interested in this matter, in placing before us such a comprehensive statement of the case.

Gen. H. C. King (Additional Remarks).

I do not think men are entitled to large pensions simply from the fact that they have saved the Government. I do not want to throw discredit here upon the business of getting pensions for old soldiers, but is it not true that in nine cases out of ten these claims for increase do not originate with the old soldier? How many never thought of an increase until they received a circular (and most of us have received them) from a claim agent? They will get your claim through, or will get some influential person to push it through; then comes another circular: "You are entitled to a pension or an increase; send me ten dollars and I will get your application through."

Now, the time is coming when the men who are paying taxes, the younger generation, will want to know, When is this thing going to stop? They will say: "Are we always going to pay war taxes? We are ready to take care of the men that were wounded and maimed, but this increase of pensions must stop," and I am afraid instead of getting a dependent pension and a service pension, in the not remote future, a reaction will set in and beneficial legislation cease.

I am proud to say that the great mass of *the old soldiers of America are still able, thank God, to take care of themselves a little longer.*

Lieut-Col. J. L. Follett, N. G., S. N. Y.

I have listened with pleasure to General Howard's valuable contribution on the subject of pensions. I am in harmony with his remarks. I do not, however, regard this a generous republic. I think, if we will refresh our memories, we will all say the same.

I had the honor to serve in the Army from the breaking out of the War to the close. I have never received a pension or bounty.

If you remember (those of you who participated in the War), a soldier was to receive a certain amount of pay a certain amount of clothing, and a certain amount of rations. I do not know where General King served; but where I was (General Sweeny was there also) we rarely received *half* rations, and sometimes no rations at all.

[Here the speaker was asked by General King, in what army he served?]

I was in South-west Missouri.

General King replied: I was in the Army of the Potomac.

Well, the Army of the Potomac was always better fed, I believe.

Now then; if you remember, under this contract, he was to receive a certain amount of rations, clothing (which was principally shoddy), and he was to receive a certain amount of pay, in greenbacks worth forty cents on the dollar.

A soldier who served faithfully for his Government in her hour of danger is entitled to a just and a fair pension.

We should hear less talk about generosity. This Government cannot do enough for the soldiers who marched and fought in its defense, and I think it very poor policy to let any such men die in the "poor-house."

Lieut. J. C. Bloom, (late) U. S. Army.

I have listened to General Howard's paper with great interest, not as a soldier, but as a citizen, and because I am deeply interested in the subject of pensions. I was not in the recent war, and think that those who remained behind want the matter arranged in an economical and fair manner. I see no reason why the men that remained at home should not do something for those who went to the front in the time of danger.

I can readily understand how a service pension law can be framed so that those in need would receive a proper and fair amount, and it seems to me that they should. I know no better way than by an unanimity of opinion amongst ourselves. If you will unite upon some definite plan of action and form some general estimate, I believe that it can be adopted.

Speaking about an estimate reminds me of an occurrence when I was an officer in the 4th Artillery. I was detailed to draw up plans for some improvements at Fort Canby, I was post quartermaster; I did so; I think my estimate was about $1,300, it was for the erection of a cottage. The estimate was first submitted to the post commander who cut it down about one-third, in that shape it went to Oregon to the chief quartermaster, at all events it reached San Francisco, where it was again cut down. The Quartermaster-General's Department in Washington finally diminished it to at least one-third the original amount; in that shape the appropriation was obtained and the result was the cottage we erected, on the small amount allowed, was very poor. Now, if all these officers, to whom the estimate was submitted, instead of cutting it down, had increased it, I have no doubt the sum would have been appropriated.

Now, if you do not make your estimates large enough to allow them to be cut down, you will get but a very small appropriation in 1900; therefore, it seems to me, we must determine upon some plan and recommend it, and I have no doubt it can be adopted.

J. Joel, Esq.

I have listened with a great deal of pleasure to General Howard's paper on pensions. I have given this subject a great deal of thought and careful study. There were two classes of soldiers during the late War, one short-term and others who were long-term soldiers. There were two bills introduced into Congress, one was known as the "Per-diem Pension Bill," and the other the $8 per month bill; a man who served 60 days would, under the per-diem bill, of one cent a day, receive 60 cents a month pension, and a man who served a year $3.65 monthly. I believe that we can have a service pension bill, and that less evidence should be required of the claimant to secure him his just dues; what we want is justice to all.

This question will come, and if we have the courage to get up and advocate it, justice will be given to men who stood shoulder to shoulder and fought for their Government. There is no doubt that we shall get at it all in time, and that we will arrive at some definite decision on this subject.

I have just been asked what all this would cost? I have been figuring upon this for months. The amount given in our Pension Reports for 1888, is $12,300,000 and the number is about 6,500 pensioners. I find from inquiry at different insurance offices, that the soldier, to-day, is better preserved than the ordinary run of citizens.

The per-diem service pension bill would call for about 45 millions, and the $8 per month bill, for 60 days service, estimated from 137 to 140 millions.

Brig.-Gen. T. W. Sweeny, U. S. A.

I move that a vote of thanks be extended to General Howard, for his very able and interesting paper, and that permission be requested for its publication in the JOURNAL. Carried unanimously, and the meeting was adjourned.

III.

"The Desertion Question."

Col. Richard I. Dodge, 11th U. S. Infantry.

To the *Army and Navy Journal* I contributed a short criticism (Sept. 28th, 1889), on the very able article by Lieut. McAnaney (JOURNAL M. S. I., Sept., 1889).

From the very great number of articles on this subject that have recently appeared from all classes and grades of Army men, each as a rule differing from all others, it must be conceded that the question is as far from solution as ever and the cause of desertion like taste, "*non est disputandum.*"

Among the several articles on this subject in the JOURNAL of the Institution of November, is one specially commending Lieut. McAnaney's third reason: "The low social position of the enlisted man" and insisting, in elaborate argument, that *Military Caste* is at the bottom of the trouble.

Outside of India there is no society in the world to which the term "caste" can properly be applied. As used by us, the word indicates simply the rank, grade, or place in the general society held by each individual, but which (unlike caste in India) is liable to be changed at any time by special ability or the reverse, wealth, poverty, or even mere accident. This kind of caste (meaning that individuals in certain positions as to intellect or pecuniary means, or business association prefer to choose their associates and friends from among individuals similarly situated) is as old as society itself and will continue as long as society of any kind exists. Even among socialists, the most rampant theorists for *egalité* and *fraternité*, this kind of caste holds as full sway as in any other less pretentious society.

As I understand the argument, the special point is, that while caste in civil life is eminently right and proper, caste in military life is unjust and tyrannical, "because a law stands behind it."

The value of all argument and criticism depends on the truth of premises. The article referred to assumes that "a court-martial stands ready for the officer who associates with his men." There is no law or regulation prohibiting such association. It is a matter of custom only. I have had a private soldier a guest at my dinner table, and I contend that I have violated no military law or principle.

Admitting that charges under the 62d Article of War may be made against an officer for "associating with his men," the onus of proof that such association is "prejudicial to good order and military discipline," must lie with the prosecution. The result would depend entirely on evidence whether in that particular case the association was or not to the prejudice of good order and military discipline.

I put charges (which resulted in dismissal) against an officer who was found drunk with his men in a public bar-room. I have heard of another who was forced to resign for gambling with his men. In these cases the association was undoubtedly "to the prejudice," but it is easy to imagine or experience cases where such association could be productive of nothing but good. Much as he deprecates these fancied "terrors of the law," I know the writer of that article so well as to be assured that he would risk all these terrors and take to his heart and home the son of his old friend and class-mate just as readily and as warmly as if he were not an "enlisted soldier."

An officer of the Army once covered himself with the contempt of myself and other officers present, by refusing, at a public hotel, to dine at the same table with two enlisted men, all of us being in uniform and the enlisted men behaving with perfect propriety.

It is claimed that our "caste" exclusiveness comes from the English. Having

once been a part of Great Britain we naturally took many of our ideas from that people, especially those regulating the military and naval services. But the English are not responsible for this exclusiveness. It is an inheritance from the feudal ages.

It is a curious fact, not however generally recognized, that the lack of personal association between officers and privates is to-day more pronounced in Germany, Russia, and other European countries than it is in England or the United States.

In Germany a conscript may be assigned to a company of which his brother is captain, yet there can be no *association* between them. Not only so, but a brother, a corporal, can have no association with his brother, a private. A broad line is drawn between the non-commissioned officers and the privates. A private in speaking to even the lowest corporal must stand at attention and address him as "Sir." This admirable adjunct to discipline is maintained by large increase of pay and personal consideration to the non-commissioned officer, a corporal of the lowest class receiving twice, and one of the highest class, three times the pay of the private. The sergeants receive from four to five times the pay of the private. These non-commissioned officers have their own mess and club, and "associate" only among themselves. In short, the "exclusiveness of caste" sought now to be established as the great cause of desertion in the Army of the United States is infinitely more pronounced in the German armies, in which there is very little desertion.

Within comparatively recent years individualistic, socialistic and philanthropic ideas have occupied the time and attention of great numbers of men of influence, and from these no class of people in the world has received as much comfort or made as much progress in the social scale as the enlisted men of the United States Army.

Forty years ago the enlisted man was simply a machine—to fight or work, as occasion required. Scattered in small posts over our vast frontier, quartered in little huts built by themselves with air space in many cases less than 100 feet per man, their beds, three-story bunks in which nine men were packed three together, their bedding, a bedsack (stuffed with prairie grass) and a scant supply of blankets, their food, the ration pure and simple, their pay sometimes six months in arrears; and individuals were confined in the guard-house often for ten months awaiting the assemblage of a court-martial for their trial. Whipping and branding were authorized by law. From the difficulty of assembling courts-martial, company commanders were permitted to control their companies pretty much as they pleased. Beating, bucking and gagging, the wooden horse and tying up by the thumbs were constantly resorted to. No books, no schools, no instruction except in drill; no effort at improvement, moral or social; the soldier was a mere animal, treated with as little consideration as a refractory mule, and had as little social standing.

Personal courage in the Mexican War had given commissions to a few, but there was no *legal* provision for the advancement of the enlisted man to such commission. His future was a hopeless blank—the death of all ambition.

Compare his condition then and now. Concentrated in larger posts, magnificent quarters, each man provided with a bed as luxurious as that on which the Emperor of Germany is said to sleep, food as good and varied as that of their officers, pay prompt, no punishment except by sentence of court-martial, at every post daily papers and magazines, a library and school of instruction for its enlisted men, games and athletic sports encouraged, and at regimental posts and others where a band can be made up, dances given for and by the enlisted men, to which flock young girls from all the neighborhood. The soldiers' dances at Fort Sully, Dakota, were attended by the best citizens in all the country around. Unfortunately, when stationed in older communities, there is always some soldier contemptible enough to bring to these dances women of bad character, lowering by association the social standing of all.

XUM

This can never be remedied until the best class of soldiers take the matter in hand and drive from their association the man and woman. There is an old adage, "It's a dirty bird that fouls its own nest." There is mathematical certainty that "a chain is no stronger than its weakest link." Let the self-respecting and respectable element (largely in the majority) assert its manhood and insist that "the dirty bird" shall not foul the common nest, and the weak and vicious links of the chain of military brotherhood will soon be eliminated, to the elevation of the social status of all.

Every grade of society contains, more or less, dishonorable and vicious men of which it alone can purge itself. Commissioned officers of our Army keep our brotherhood clean by ostracising or dismissing its disreputable characters. Let the better class of enlisted men try this course on those who degrade them, and a higher social standing will soon result.

As I have said in a previous article on this subject: "There is no power in the War Department or in the Government to elevate the social position of the enlisted soldier. He must do it for himself."

When the status, social, intellectual and ambitious, of the enlisted man was infinitely lower, desertion was comparatively rare. When infinitely higher, desertion is frequent. His social position is not, therefore, logically the cause of, or a reason for his desertion.

Reviews and Exchanges.

Torpedoes and Torpedo Warfare.*

ALL who are interested in torpedoes and torpedo warfare, will be glad to know that Captain Sleeman has revised and brought up to date, his excellent and well-known work on those subjects. This work contains a vast amount of information relative to the history, development and use of torpedoes, and describes nearly all the instruments, materials and appliances of any value in connection with them, whether used for offensive or defensive purposes. Illustrations are numerous, and the text is well divided into chapters, headings and paragraphs, which with the complete index table of contents, and lists of tables and plates make the work specially useful as a text-book for those who wish to learn, and as a book of reference for those who are too old, or too busy with other matters, to carry all these things in their heads.

Something less than half the book is devoted to fixed mines, or defensive torpedoes, but in that branch of the subject enough is given to enable any intelligent officer to defend a harbor, having given, of course, the men and materials. It is more particularly with torpedo boats, and auto-mobile and locomotive torpedoes that the work is concerned, and here we find all the later forms of torpedo and submarine boat, as well as experiments with and actual service trials of them.

With regard to the use of offensive torpedoes, the author remarks: "A quarter of a century and more has elapsed since the Americans first taught the world the power of the *spar* torpedo, and though, in this long interval the skill and time of naval and military scientists, and of private individuals, all the world over, have been applied to developing and perfecting the torpedo in some form or other, yet its position as a factor in naval tactics, the part it will play in future naval wars, and its proper application, still remain unknown quantities." A list of the attempts to use torpedoes in actual warfare is appended, showing that of nineteen attempts made by Russians, Chilians, Peruvians and French, only six were successful. The moral effect has been great, but the actual results must be considered as decidedly unsatisfactory.

If we were to note any additions or omissions as being desirable, it would be that more prominence might have been given to the electric search light and its accessories and uses; and that some of the space for this might have been made by omitting the so-called "sea-cell test," which, as the author remarks, is too delicate and cannot be relied on.

W. R. K.

Battles and Leaders of the Civil War.†

To this collection Army and Navy, Federal and Confederate, Officers and Men, Staff and Line, the Newspaper Correspondent and the Hospital Nurse, have all contributed, so that instead of being digested into history according to some philosophi-

**Torpedoes and Torpedo Warfare.* By C. Sleeman, Esq. Second Edition. Published by Griffin & Co., Portsmouth, Eng. (25 shillings.)

†The Century Co., N. Y. City. 4 vols.

cal scheme or some individual interest it combines the results of observations and experience from all points of view and under all the varying fortunes of our great Civil War.

If error is not eliminated by any such process, at least more of the truth is effectively brought to notice, just as every ripple on the bay catches a portion of the sunlight and helps to throw a broad stream of radiance over the depths below.

"To lie like a bulletin" has passed into a proverb, but official reports are simply a part of the campaign and ought to be prepared, like the operations themselves, with due regard to the interests of the Service, the mystification of the enemy and the encouragement of friends.

As Prince Eugene recognizes, in War "one must sometimes work for the newspapers," if for no better reason than that the newspapers may work for you.

But these restrictions do not fetter the pens that write without reference to Congress, Cabinet or circulation.

Between what can be said by the man in the ranks and the man on horseback, the man who meets the enemy's bullet and the man who prefers to encounter the provost-marshal in the rear; between the man who has a grievance, and the man who has the glory, the public finds increased chances of getting at the facts in the case and nowhere, either in official reports or in personal memoirs, are they presented with so much fulness and variety as in the four volumes under review.

Of these the first, beginning with "Washington on the eve of the War," concludes with the loss of the *Monitor*, the second carries on the course of events as far as Corinth and the third closes with "Longstreet at Knoxville."

The campaign that began with the Wilderness and ended with Appomattox, those of the Shenandoah Valley, the March to the Sea, with its verification by the battles of Franklin and Nashville—for what shall it profit a Nation if it gain Savannah and lose Cincinnati—naval and military operations in the Department of the Gulf and along the Atlantic Coast form the contents of vol. 4, which concludes the series and possesses an elaborate index to the whole work.

Very thorough statistical information as to the composition of the armies and the respective governments, the strength and losses of the forces engaged, an account of events preparatory to the War, and a running comment of note and explanation upon the text, the maps, illustrations and sketches, all complete, and carry the history up to a degree of excellence that cannot fail to commend it to the general reader and make it of special value to the military student, while it may be added that print, paper and binding correspond to increase the satisfaction of the man who loves to see in his literature not only a *curiosa felicitas* of content but also the *simplex munditiis* of appearance.

General Hill, in a very interesting article upon the battle of South Mountain or Boonesboro, says: "So many of the battle-fields of the Civil War bear double names that we cannot believe the duplication has been accidental. It is the unusual which impresses. The troops of the North came mainly from cities, towns and villages, and were therefore impressed by some natural object at the scene of conflict and named the battle from it. The Southern soldiers were chiefly from the country and were therefore impressed by some artificial object near the field of action. In one section the naming has been after the handiwork of God, in the other it has been after the handiwork of man."

It is quite possible the differing civilizations of the two groups of States, leaving their mark so strongly upon the institutions and sentiments common to each, may also have differentiated their nomenclature, but a more prosaic reason can perhaps be found in the opposite directions from which the armies drew near one another.

As the Northern forces left behind a landing, a mountain or a stream, they called the subsequent conflicts accordingly, to which the Confederates gave a name from the church, the village or the station by which they passed to the same battle. The reader can test either theory from the names below quoted from the paper in question:

Boonesboro,	called by the Federals,	South Mountain.
Manassas,	" " " "	Bull Run.
Leesburg,	" " " "	Ball's Bluff.
Shiloh,	" " " "	Pittsburg Landing.
Murfreesboro,	" " " "	Stone River.
Cold Harbor, name of a tavern,	" " " "	Chickahominy.
Elk Horn, " " "	" " " "	Pea Ridge.
Sharpsburg,	" " " "	Antietam.

Similar instances for similar reasons occur in European history.

Marlborough gave the name of *Blenheim* to the battle fought in the vicinity of that village, called, however, by the French, *Hochstadt*, because that was the village nearest them.

So the Prussians speak of *Sadowa*, but the Austrians of *Königgrätz*.

There is no romance, however, in the General's statement that "The noisy speakers of 1861 who fired the Northern and the Southern hearts never did any other kind of firing." And they keep it up now with no less readiness and no more exposure.

In these war papers can also be found what will in vain be looked for in many a more pretentious history, some intimation of actual battle formations and details as to calibre and range in the matter of siege artillery.

At the attack at Fredericksburg, General French was directed to prepare his divisions in three brigade lines at about two hundred yards distance, and Hancock to follow in the same order.

At Chickamauga, Longstreet's troops were placed in columns of brigades at half distance, Hood's division massed five brigades deep.

At the reduction of Ft. Pulaski, which marks an era in the art of fortification, there were employed twelve 13" mortars, six 10" columbiads, four 10" siege mortars, four 8" columbiads, five 30-pounder Parrotts, five James rifles, the latter being the old 24, 32 and 42-pounder smooth bores, rifled and carrying double weight projectiles, 48, 64 and 84 lbs. respectively. These were used at ranges of about 3,000 yards for the S. B. and 1,650 for the others, and did the business very effectually in spite of General Totten's belief that the fort "could not be reduced in a month's firing with any number of guns of manageable calibres."

As for our old friends, the 13-inch mortars, it causes no surprise to learn that though "carefully and fairly well served, they were from some cause practically inefficient, not more than one-tenth of the shells falling within the fort."

It is to be hoped that the modern rifled mortar will redeem the expectations that seem to be cherished in regard to its accuracy.

General Wheeler, in his paper upon Bragg's invasion of Kentucky, notices how the War divided not merely States but families. "Friends, neighbors, kinsmen and even brothers bade each other adieu and separated, one to the Northern and the other to the Southern forces."

Of the Crittendens two brothers served in the Union armies and one in the Southern. Of Henry Clay's grandchildren, three and four respectively. Of the Breckinridges, the Vice-President and three sons were on one side and his cousins, the eminent Presbyterian divines, on the other. Of the elder of these cousins two sons served in the

Confederate and two in the Federal armies, and in the battle at Atlanta one of these brothers became a prisoner to the other.

Blood is thicker than water perhaps, but it is certainly thicker than ink, and is now beginning to assert its color over the sombre assertion and terminology in which the earlier passions of the War found relief.

The smoke of battle is a good disinfectant and its flames are a wonderful revelation.

In General Buell's paper upon Perryville is an interesting study of the effect upon the War of sectional characteristics, whether displayed in viewing the contest as an enforcement of the Constitution and the laws upon the whole country by the North, or as an appeal to revolution and independence on the part of the South, leading in the one case more to collective action with the method and delays of a public policy carried out by representatives already in possession of the traditions, channels and customs of the old Government, and in the other to the desperate energy of individual enthusiasm, unshackled by precedent and careless of former habitual limitation and restraint.

Then throughout the War, for the most part, the North was the invader, and the contest was pushed farther and farther into the heart of the South, requiring and consuming the superior resources of the Unionists. Personal differences between the two sections and the simpler mode of life to which the South was accustomed, affected the questions of supply and transportation largely in its favor. The populations of the South if less metropolitan were more nomadic. Their knowledge had not been picked up at academies so much as by field and stream, and they knew more of cross-roads than of classics. They were more accustomed to rely upon what they could do and less upon what they could get.

These tendencies gave for cavalry and infantry a ready-made material, the preparation of which in the North took time and experience.

It is evident enough, also, that the South were too wise to go into their political underbrush for military timber. Lee, with his corps commanders, Longstreet, Jackson, Hill, Ewell and Stuart, possessed and held the confidence of the country from the beginning, nor were their movements dominated by the assumption or timidity of governors or committees.

Gen. Gilbert quotes a curious incident. The evening before the battle of Perryville, Terrill, Jackson and Webster, in discussing the chances of being hit, agreed that men would never be frightened if they only took into consideration the theory of probabilities and recognized how slight the chance was that any particular person could be hurt. In the next day's fight all three were killed.

In the account of the siege of Charleston we find the *Swamp Angel* to have been an 8-inch Parrott, fired at an angle of 31½ degrees, with a charge of 20 pounds powder at an extreme range of 5¾ miles, for which data we hunted in vain through quite a large military library, where we encountered any amount of strategy, but very few statistics. The former one can manufacture for himself, but the latter, like poets, are born, not made.

This paper also contains a valuable discussion of Coast Defense, what is essential and what is accessory, and an exposure of the fallacies still prevalent. The subject is in no danger of being worn threadbare if we give it a little consideration in the very words of Gen. Gillmore.

It is, he says, an error to suppose that a defense by torpedoes, however perfect in itself, can stand alone. The torpedo must be protected from removal by the enemy, and the only efficient protection is shore batteries of heavy guns.

The auxiliary defense by torpedoes should be of such magnitude that no fleet could

attempt to run the gauntlet without imminent risk of destruction. A defense of this potential character is a most powerful conservator of international quiet and good will.

The chief office of permanent fortifications is to avert war. They are the guardians rather than the champions of the public good and of the property of the people.

Equally to the purpose is what follows also from Gen. Gillmore. Destructive energy of the same denomination is neutralized when placed in opposing hands. Fleet arrayed against fleet leaves too much to risk and accident, with our stake on the issue immeasurably greater than the enemy's.

We must depend mainly upon those agencies exclusively our own, which cannot be neutralized or duplicated by our antagonist, and will therefore always keep him at a disadvantage, *i. e.*, permanent shore batteries and their attendant channel torpedoes. All naval power possessing seagoing qualities may be neutralized entirely.

Perhaps as interesting a paper as any of the 4th volume is the account of the surrender at Appomattox C. H. by Gen. Porter, in which the details of that great event are given with a fullness that shows how sharply they were impressed upon the memory of an observer not unconscious of his fortune in being present at one of those scenes upon which poets, orators, and painters delight to dwell and into which is gathered so much of past struggle and future promise ; both promise and struggle, however, as with all things of Divine shaping, made to reveal their real nature slowly as the years go by and prove them to be far other than the passions of men either dreaded or prayed for.

The interview between Gen. Grant and Gen. Lee took place in the house of Mr. McLean, whose former home was near the battle-ground of the first Bull Run and used for a time as headquarters by Gen. Beauregard.

Certainly, as Gen. Porter says, it was a curious coincidence that the first and last events of the War were enacted upon the lands of one and the same man who, by the change, had hoped to escape from the reach of the contending armies.

But time fails us. There is hardly a leaf in these four volumes that does not furnish something to arrest and fix the attention. They have their attractions where simply the adornment of the shelf is in question, but to a man whose library originates in his needs and so becomes a growth instead of an accumulation, the *Century War Papers* fulfill the definition of a perfect book as one the contents of which shall serve to detain the idle and satisfy the scholar.

The reader who desires to enter into the vexed questions of responsibility for failure and credit for success that arise out of the operations of war, where the efforts of the many and the faults of a few contribute so materially and yet in such blended proportions that the right of ownership in the result is as difficult of determination as that of the farms superimposed by a landslip, will find each side impartially presented, and can exercise his ingenuity in balancing facts and inferences until he has constructed some little cosmos of his own, but even with all that is before us one cannot help thinking of that larger part that has not been told and of how much of this now never will be.

It lies voiceless in the graves of Lee and Jackson, Lincoln and Thomas, while scribes, envious and anxious, stumble and peep over their tombs aud labor with puny interpretations of the great mystery to which when living they had little access, and only afterwards approach with still less reverence. H. W. C.

"Notes" and "Memoirs."

It is, proverbially, unprofitable to kick a dead lion. The act is apt to provoke comparisons at the expense of the kicker, and the plea that it is done in defense of other dead lions seldom avails in the world's judgment.

In a pamphlet* of 77 pages, Col. Carswell McClellan endeavors to dim the lustre of Sheridan's military reputation by accusing him of insubordinate and disloyal conduct toward the late General Meade, and arbitrary and illegal action in the case of the late General Warren. In attempting to sustain his charges, Colonel McClellan makes copious citation from General Sheridan's "Memoirs," and the official records, including the Report of the Warren Court of Inquiry. A few remarks, only, upon the salient points of this pamphlet are possible here.

Its author opens with an eulogistic paragraph upon the Cavalry Corps of the Army of the Potomac, although he also, somewhat inconsistently, remarks "that Corps needs no Eulogy here." General Sheridan's statement† as to the condition of the Corps when he joined it in 1864, the excessive picket duty required of it, the superior wisdom of the enemy in husbanding his cavalry during the winter, etc., are quoted as evidence of that commander's intention "to spurn the record of the men who * * led by Generals Buford and Gregg, under the command of General Pleasanton, through the long hours of June 9th, 1863, crossed sabres with the Cavalry Corps of the Army of Northern Virginia." It may be news to Colonel McClellan that, before General Sheridan's advent upon Virginian soil, the points just recited had been officially represented by the cavalry leaders mentioned, and were the subject of daily complaint by subordinate commanders, of whom the undersigned was one. It is no reflection upon General Hooker, the creator of the Corps, nor upon General Stoneman, the first to command it, to say as General Sheridan did, that when he was assigned to command the cavalry of the Army of the Potomac, by reason of the custom of unduly subordinating its operations to the movements of the main army, that *in name only* was it a corps at all. A cloud of witnesses may be found to verify this fact.

Nor was it impertinent nor insubordinate, under the letter and spirit of his assignment by the Lieutenant-General present with the Army, and directing its operations in person, for General Sheridan to express to General Meade his views as to the proper use of cavalry in the field; views which, in spite of inflexible tradition, have recently been adopted by the leading military Powers of Europe. The sooner it is admitted that, while *nominally* "commanding the Army of the Potomac," General Meade, upon the arrival of Lieut.-Gen. Grant at its headquarters, became simply Chief of Staff, the easier it will be to deal justly with General Sheridan's words and deeds as the Chief of Cavalry. General Grant desired more cohesion and independence in his mounted force, and selected Sheridan, of the soldiers best known to him, to carry out his purpose; and one ardent Buford admirer, who then saw no necessity for *importing* a corps commander, will always testify to the wisdom of General Grant's choice.

No ingenious distortion nor sinister interpretation‡ of the language used by Sheridan, in his reports and memoirs, can ever make him anything but a subordinate and loyal, if, sometimes, an impetuous soldier. That Colonel McClellan finds it necessary to arraign the Lieutenant-General, the superior commander of both Meade and Sheridan, for his approval of the latter's course, denotes weakness on the part of the accuser.

The other part of the pamphlet is devoted to a rather involved description of the operations immediately connected with General Warren's summary removal from the command of his Corps at Five Forks. The findings and opinions of the Court of Inquiry (absolutely free, as they are, from censure of General Sheridan) are interwoven with the author's comments and deductions. He claims that General Sheridan acted illegally in relieving General Warren, and ungenerously in not exerting himself to

*_Notes on the Personal Memoirs of P. H. Sheridan._ By Carswell McClellan, Bt. Lieut.-Col. U. S. V. St. Paul, 1889.

†"Memoirs," p. 352, vol. 1.

‡See "Notes on the Personal Memoirs," etc., pp. 4, 20, 24.

exonerate that officer after the War. General Grant, also, comes in for a share of animadversion on the same account. It seems to survivors who cherish the memories of those great soldiers, that no good can come from thus reviewing the misfortunes of any. The friends of General Warren will always hold that he was unjustly treated; cold, impartial, professional opinion will, nevertheless, be formed upon the official testimony as sifted by the Court of Inquiry, and neither "Memoirs" nor "Notes," written a quarter of a century after the event, will be preferred for that purpose. Warren's figure, erect upon the "Round Top," will stand out, distinctly, in the sunshine of memory long after the forest trees of Five Forks have ceased to cast a shadow. General Meade, were he alive, would be the first to deprecate this latest *post bellum* examination of the joints in his contemporaries' armor.

Surely, the time has come when the War for the Union should be discussed in an impersonal light, upon its professional merits only, and for the benefit of the soldiers of the near future. To them the personal controversies of the Army of the Potomac will possess no greater value than those of the Army of the Revolution.

T. F. R.

The Boy Spy.*

The War for the Union, 1861–65, is remarkable, above all human conflicts, for the number of pens that have sought to preserve its history. Realizing, as it seems, that the materials—the bricks and the mortar—must be gathered together, before the Master Builder can begin his work upon the great historical edifice, each soldier has brought forward his "own story" of skirmish, or battle, or campaign, and in imagination lays it at the feet of the coming Homer who shall immortalize American valor. One of the latest and not the least in importance of these literary bricks is "The Boy Spy,"—a title hardly worthy of the valuable information contained between its smart blue-and-gold covers. For it is not simply a juvenile work, nor does it consist of the lurid trash too often, under similar caption, unloaded upon an undiscriminating community. Between its lines—descriptive of the author's personal experience, first as a wild youth rushing into the enemy's country from pure love of excitement, and afterward taking his life in his hands as an experienced scout and soldier—may be read the shaping of the policy of a great Government; the slow awakening of a great people to the public danger; the rude methods at first resorted to in organizing masses of armed men, and the intrigues attending the appointment of their leaders; glimpses of the personality of Presidents, Cabinet Ministers, Commanding Generals, Flag Officers and Legislators, in moments of perplexity or triumph, as words fell from their lips in the confidential atmosphere of the telegraph office, or under the strong excitement of the battle-field. Commencing his adventurous career with the first mutterings of the storm in 1861, and with the aim of winning his spurs by some deed of daring and special service to the Government, we find "the Boy" at New Orleans watching the growth of the Secession flame, slipping through the lines in front of Fort Pickens with important information for the garrison, detained on board a United States war-vessel as a suspicious character, but eventually sent north as a friend to the Union; imprisoned in the Old Capitol prison, from which he escaped and enlisted in the Regular Cavalry, taking part in the Stoneman Raid of 1863; detailed on "special service" at Burnside's headquarters; at Gettysburg; in Tennessee; mingling with leading Confederates at Richmond and, anon, with Senators at Washington; unconsciously treading the tortuous, dangerous path of André and Nathan Hale, with the possibility of a long rope and a short shrift at the end.

In the "action" of this true tale the reader is reminded, now of Defoe, then of Verne and again of Charlie King, although it lacks the literary smoothness of those

*_The Boy Spy_. By Major J. O. Kerbey, Washington, 1889.

writers. The author writes as he acted in war times—quickly and intuitively—and without much attention to grace of diction: as he expresses it, he "fires low to hit the masses" and he "calls a spade, a spade." Through the coarse web of privation, wounds and war, runs the silken thread of the tender passion, giving the story the touch of romance so often omitted when our battles are fought o'er again in our dignified, grandsire, moments. Many full-page wood-cuts embellish the work.

Besides its historical data this book contains interesting biographical material, especially regarding Abraham Lincoln, Jefferson Davis, Andrew Johnson, Simon Cameron, Edwin M. Stanton, John Covode, "Ben" Wade, "Parson" Brownlow, Generals Hancock, Howard, Fitz John Porter, Doubleday, Burnside, Admiral Porter, *et al.* It deserves (what it is said to be getting) wide circulation. It is "sold by subscription," but the author states that he will mail a copy, to any one, on receipt of price, $2.

R.

Military Expositions.

There is nothing so impressive nor so potent an educator as an object lesson. For the purpose of reaching the hearts and understandings of the masses and imparting, in one day, a great variety of information concerning the Art and Science of War, a modern Military Exhibition is to be commended. Since the Philadelphia Centennial of 1876, such an annex has formed a popular part of every World's Fair, and very recently, at Edinburgh, a "Military and Naval Exhibition," held under the auspices of some of the most distinguished soldiers and sailors of Great Britain, has proved such a success that one upon a grander scale is soon to follow in London.

A neat publication from the Government printing-office, just at hand, records the interesting exhibit of the War Department at the Cincinnati Exposition of 1888–89; the collection of relics, trophies and modern weapons, and the admirable catalogue, in which each object is described, reflects the highest credit upon Capt. A. H. Russell, Ordnance Department, the officer in charge. The industry, tact, and general military information required of an officer assigned to such duty makes the detail anything but a "soft thing;" it is, however, a duty of great importance, bringing into closer relations the Army and the People.

T.

Vireun School Methods.

Nineteen years ago Major H. C. Symonds opened the Vireun school at Sing Sing, N. Y. Here he proposed to prepare candidates for admission to the United States Military Academy.

From all parts of the country, and from schools in Europe, pupils have come during these years, and the experience gained in their instruction has been embodied in the text-books which Major Symonds now offers to the public. Twenty years ago the examinations at the Military Academy were exceedingly simple, but the standard for admission has steadily advanced, from year to year, until it now calls for a knowledge which can rarely be acquired by the youth of average capacity, except in a thoroughly high school course of study. From the best text-books a process of sifting out, abstracting, or making a digest of those parts that from experience seemed of highest importance, was then begun.

These extracts have gradually assumed the shape in which they now appear, and we predict for them all the success which Major Symonds' experience would lead us to expect.

B.

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VOL. XI. MARCH, 1890. NO. XLIII.

THE DEVELOPMENT OF SUBMARINE MINES AND TORPEDOES.*

By FIRST LIEUT. JAMES C. BUSH, U. S. A.,
Fifth Artillery.

THE Civil War, 1861-65, demonstrated upon a grand scale the important part which the modern torpedo can be made to play in maritime warfare.

Prior to this period its effectiveness had never been proved in actual war.

Bushnell in 1776-78, Fulton in 1801-7 and Colt in 1830-44 had shown by practical experiments the destructive effect of subaqueous explosions of gunpowder and had urged the adoption of the torpedo as an important weapon for destroying hostile vessels, but neither in this country nor in Europe did the subject receive the attention it deserved. The ideas which the Confederates put into practical form during 1861-65 were simply an elaboration of those of Bushnell and Fulton, to which was added an electrical system almost identical with—certainly not an improvement upon, that proposed by Colonel Colt.

* As now generally understood, the word *torpedo* applies to cases constructed to carry an explosive agent to a distance, having within themselves their motive power and capable of firing their charges under water on contact.

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* As now generally understood, the word *torpedo* applies to cases constructed to carry an explosive agent to a distance, having within themselves their motive power and capable of firing their charges under water on contact.

Bushnell was the first to perceive and experimentally establish that the pressure of water alone may develop an intensity of action in sub-aqueous explosion sufficient to destroy a vessel in the vicinity. It was he who gave the name "torpedo" to a case containing a charge of gunpowder to be fired under water. He introduced the use of submarine boats, and of drifting torpedoes both coupled to a line and floating freely with the tide.

To Fulton is undoubtedly due the credit of originating the use of what are now known as submarine mines or torpedoes anchored to obstruct a channel. Fulton simply improved upon and developed Bushnell's *offensive* machines, but he *originated* the method of operating now known as *defensive* torpedo warfare.

The term is qualified for descriptive purposes and includes controlled or locomotive torpedoes, which like the other carry their own motive power, but are under the control of an operator, who, at a fixed station directs their flight and may fire the charge by means of electricity. Other "qualified" torpedoes are of the towing, drifting and spar class. Submarine mines include all cases containing an explosive agent which are retained in a certain position either by their own weight (ground mines) or by moorings (buoyant mines).

They are also divided into two general classes, controlled and self-acting.

Those of the controlled class have other designations depending on the mode of firing, as "observation" mines (fired entirely by some method of observation or judgment), electro-contact (fired by "contact") and combination-contact (fired both by contact and observation).

The English propose a combination-buoyant mine having the circuit closer in a separate buoyant case and connected electrically to the fuse in the mine.

Self-acting mines are divided into electrical (fired generally by a battery within the mine case) and mechanical (fired by mechanical means through the medium of weights, hammers, or by direct percussion, or by chemical fuses protruding on the outside of the case).

There are three methods by which controlled mines are fired.

1. By contact. { a. Automatically. b. At will.
2. At will.
3. By observation.

(a) By this method a controiled mine becomes for the time a self-acting one through the medium of the circuit closer.

(b) In this case the actual firing is placed at the will of the operator. The "contact" causes a bell to ring, thus indicating the particular mine or group struck.

"At will" firing is a mode whereby the mine or group may be exploded at the will of the operator whether circuit closers be provided or not and without contact being made.

Observation or judgment firing is usually confined in most systems to simple observation ground mines, though it may be applied, but with far less accuracy, to buoyant mines as well ; such a mode requires, of course, some method of cross-bearings or other system of position-finding by which the actual moment when the hostile ship is over or sufficiently near a mine may be determined.

As finally presented his system included four classes of torpedoes.

1. Buoyant mines to be exploded mechanically by contact (stationary type).

2. Line torpedoes designed to be set adrift and fouled by the cables of the hostile fleet at anchor.

3. Harpoon torpedoes to be discharged from a gun and fired by clockwork.

4. Blockship torpedoes to be carried on booms projecting from vessels of a peculiar type and exploded by contact.

Colt worked out a system of buoyant submarine mines to be planted quincuncially in the threatened channels and operated by electricity. By introducing this agent for igniting the charges, he rendered it possible to perfect both classes of torpedoes, movable and stationary. To convey the current he devised one of the first submarine cables ever attempted. Each cable included two separate conductors which, entering the mine, were united by a fine platinum wire imbedded in gunpowder. One set of conductors from all the cables were united and permanently attached to one pole of a powerful battery. The others led to a map of the channel, each one being secured at the point corresponding to the known position of its mine. A reflector threw the image of the hostile ship upon this map, and as the image passed over a wire terminal the operator with the other battery wire closed the proper circuit. By this means he could permit the passage of a friendly vessel or prevent that of a hostile one.

Similar ideas found application in the Schleswig-Holstein War (1848–50), the only difference being that Prof. Himley made use of the earth as a return circuit and dipping batteries to cause the explosion at the proper moment, determined by two observers communicating by pistol shots.

The Anglo-French war with Russia (1855) produced the Jacobi fuse*; also the improvement of placing the igniting apparatus within the torpedo, independent of external levers; and showed that the charge (ten pounds of gunpowder) was far too small even against the wooden hulls of those days.

The Austrians in 1859 adopted a plan very similar to that of Colt, a return circuit being obtained through water and earth. A

* The Jacobi fuse or igniting apparatus consisted of a glass vessel containing sulphuric acid. On the glass being broken by shock the acid flowed over a quantity of chlorate of potash, causing the explosion of the gunpowder.

XUM

charge of 400 lbs. gun-cotton, floated twelve feet below the surface, displaced the gunpowder in Colt's plan.

The torpedoes employed by the Confederates may be grouped in five classes: stationary torpedoes; automatic drifting torpedoes; infernal machines; offensive spar torpedoes; and submarine boats.

With the exception of electrical mines, stationary torpedoes consisted of contact mines fired mechanically, the percussive ones having the Rains* or Jacobi fuses.

The electrical torpedos differed from those of Colt in being judgment ground mines, range stakes, instead of a reflector, being used to determine when a vessel was within destructive range.

A low tension fulminate of mercury or the Abel fuse, with Wheatstone's exploder or Grove and Bunsen's cells, constituted the firing agents through the medium of single core gutta-percha cables. Their mine cases included almost every imaginable form and material, but toward the last they employed regularly constructed cylindrical or pear-shaped riveted ones of boiler iron. The charges were often unnecessarily large, little being known of the laws by which their dimensions are now regulated.

Defective mooring sometimes occasioned accidents from their own mines. No systematic endeavor seems to have been made to protect lines of stationary torpedoes in harbors by flanking guns, much being left to the chance of their not being discovered.

A cigar shaped boat of boiler iron, carrying a spar-torpedo fired by percûssion, constituted this offensive weapon of the Confederates. While on the Union side an ordinary steam launch was fitted with the same torpedo fired mechanically at will.

The engines of both were noisy and gave no greater speed than eight miles an hour. The submarine boat was practically a failure.

The organization of the Confederate Submarine Battery Service, during the War of the Rebellion, was the first instance of an attempt to secure the services of trained officers and men. These were required to perfect themselves in this kind of warfare, to devise and experiment with all weapons pertaining thereto, and finally to use them in the face of an enemy. Mr. M. F. Maury, formerly of the U. S. Navy, the first chief of the Bureau, was

* The Rains fuse had an explosive mixture of 50 per cent. chlorate of potash, 30 per cent. sulphuret of antimony, and 20 per cent. ground glass, and exploded under a pressure of 7 lbs.

superseded by the talented General Rains, formerly of the U. S. Engineers and Artillery. To the latter officer the efficiency of the corps and value of the work accomplished were principally due.

II.

Crude as was the Confederate system, compared with those now in vogue, the effect it produced left little doubt that no nation could, with proper care for its own safety, disregard the torpedo in future wars.

To the weaker nations, especially, did the inauguration of this new and important mode of maritime warfare become of the utmost importance—for its value to them is much greater, proportionately, than to the more powerful ones. Indeed, the torpedo has been described by a well-known Englishman as "the weapon of the feeble," and undoubtedly it is a great leveller.

By strengthening the hands of the weak it has done, and is doing much to justify the sentiment inscribed by Fulton upon the title page of his first treatise on Torpedo War:—"The Liberty of the Seas will be the Happiness of the Earth."

Accordingly, soon after 1865, every civilized government became actively engaged in prosecuting investigations—still pursued—for perfecting this weapon. The resulting development is in general the following:

1. The determination of the relative values and destructive effects of explosive mixtures and compounds.

2. Improvement in the shape of the case, mooring arrangements, and manner of connecting the parts.

3. The extension and development of electrical mines, to the abatement, if not exclusion, of mechanical mines. The invention and development of circuit regulators. The improvement of fuses and range finders, and the adaptation of the electric light.

4. Improvement of torpedo boats; spar-torpedoes; and the invention and development of locomotive torpedoes.

5. The development of the submarine boat.

6. Torpedo Artillery (Mefford-Zalinski gun).

Dynamite (I = 100, S. G. = 1.6) and gun cotton (I = 87, Abbot; = 100, Bucknill; S. G. = 1.06) are the explosives usually adopted, at least for buoyant mines. Their density and great intensity of action—the latter about four times that of gunpowder—renders a less weight and volume capable of perform-

ing a greater amount of work, thus reducing the cost, weight and principal dimensions of the whole system.

The fact that extreme variations of temperature, together with changes from wet to dry, or the reverse, do not materially affect their strength, added to comparative safety in handling and convenience of manipulation formerly rendered their adaptability and consequent value greater than any others. Besides being more dense and powerful than gun-cotton, dynamite seems to possess also the property of not being liable, when in loose powder, to sympathetic explosion, even within the limits of ordinary practice, unless the case be ruptured.

Experiments of late years have been conducted almost entirely with gun-cotton in England and dynamite abroad.

The first dynamite devised by Prof. Nobel, in 1867, was at once followed by other compounds and mixtures in quick succession—to-day Major Cundill enumerates some four hundred in his "Dictionary of Explosives." Of these, experiment has shown that besides dynamite and gun-cotton, gelatine dynamite, blasting gelatine and forcite gelatine are most suitable for submarine work.

Nobel found that when, in place of tri-nitro cellulose, a lower product of the nitration of gun-cotton, viz., collodion or soluble gun-cotton, was combined with nitro-glycerine, the result had almost the character of a compound.

Thus explosive gelatine, 1881, has a composition of 89 per cent. nitro-glycerine, 7 per cent. collodion, 4 per cent. camphor. The addition of 4 per cent. camphor makes this explosive very insensitive to detonation from shock so long as it remains unfrozen. A rifle bullet at 100 yards range striking a naked slab 3 inches thick and flattening itself on an iron plate against which the slab rests has failed to ignite the explosive. Its intensity of action (I = 117) is that given by General Abbot's experiments, 1881.

Blasting Gelatine, 1884, I=142, composition=92 per cent. nitro-glycerine, 8 per cent. collodion, S. G.=1.55. Its greater density permits 300 lbs. blasting gelatine to occupy the space necessary for 200 lbs. dynamite, a most important attribute, especially for ground mines.

General Abbot concludes from the 1884 experiments that blasting gelatine without camphor is most admirably suited to submarine mining.

The difficulty of obtaining pure nitro-cotton on which the stability of these gelatines depends is well known.

This leads to forcite in which an attempt has been made to avoid a like difficulty. Forcite, I = 133, S. G. = 1.51, composition = 95 per cent. nitro-glycerine and 5 per cent. cellulose. *

Forcite in many respects resembles Nobel's explosive gelatine. Investigations indicate that it must be classed as one of the explosives worthy of serious consideration when it becomes necessary to defend our coasts with submarine mines. Its great strength is fully established; its permanency for long periods of time remains to be studied. (Abbot.)

Gelatine dynamite, I = 123 (Bucknill), S. G. = 1.55, composition 65 per cent. "A" and 35 per cent. B. A = 97.5 per cent. nitro-glycerine and 2.5 per cent. nitro-cotton. B = 75 per cent. potassium nitrate, 24 per cent. cellulose, 1 per cent. soda.

The makers of the gelatine dynamites claim that they are much more powerful than dynamite, more convenient to handle and more economical, *i. e.*, a greater effect per unit of cost.

A few governments like Spain and France seem still to retain gunpowder for ground mines, under certain circumstances (Bucknill recommends it in emergency), but here also experiment has developed increased power, due to the use of detonating fuses distributed through the mass, producing thereby much more rapid and complete combustion; but as moisture cannot be entirely excluded from a torpedo case, the use of any explosive having a soluble base seems of doubtful expediency.

In conclusion, the efficiency of an explosive for submarine mining depends on its intensity of action per unit of weight and per unit of space occupied.

The determination of the exact destructive limits of these explosives, attained almost entirely within the last few years, proves the very restricted range which they have (100 lbs. dynamite gives 16.3 ft. horizontal, 18.6 ft. vertical †) for overcoming the resistance offered by the hulls of modern ships of war. To produce a fatal shock it is estimated that an instantaneous *mean* pressure of at least 6,500 lbs. to the square inch must be secured—(Abbot). Bucknill claims 12,000 lbs. per sq. inch *maximum* pressure by Major English's rule. The standards of destructive force differ in the two cases and the figures are not properly comparable.

* It is not known that this is purely cellulose.

† 100 lbs. explosive gelatine gives 18.2 feet horizontal and 20.3 feet vertical.

The results, however, in computing actual destructive ranges, correspond within practical limits, as closely as could be expected from independent investigations of so complex a problem.

Thus, for example, the horizontal destructive ranges of 500 lbs. dynamite are—Abbot, 35. feet, Bucknill, 38.2 feet.

The following table from Bucknill gives the relative value of the best explosives:

Order of merit.	Description of explosive.	Specific gravity.	Weight of cubic foot in lbs.	Cost per lb. in pence.	Efficiency under water		Remarks.
					Per pound.	Per cubic foot.	
1	Blasting gelatine..	1.54	96.3	24	142	138	
2	Forcite gelatine...	1.51	95.4	?	133	127	
3	Gelatine dynamite.	1.55	96.9	21	123	119	
4	Dynamite No. 1..	1.6	100	17	100	100	
5	Gun-cotton dry...	1.06	66	27	100	66	
	Gun-cotton wet...	1.32	82.5		80	66	25 per cent. of added water.
6	Tonite	1.28	80		85	68	
7	Gunpowder.....	0.9	56	5	25	14	

III.

The spherical form of case has always been recognized as theoretically the best suited for buoyant mines, but cost and practical difficulties of manufacture have heretofore, elsewhere than in the United States, stood in the way of its adoption.

European cases have, however, the fault of being riveted, with bales attached directly to the case. This riveting induces rust, with consequent deterioration and leakage, increased by the constant vibration to which the torpedo is subjected.

The worst defect results from the "buckling" of the mine case by a neighboring explosion; when this happens the rivets are sure to cause leaks.

Earlier European forms of buoyant case, based on Confederate ones more or less modified, had also the disadvantage of presenting a comparatively great resistance to the action of currents. A buoy of conical form anchored from the vertex, opposes a resistance fully one-fifth greater than one of equal cross-section, having a shape approximately spherical, while the increased relative buoyancy of the latter in respect to its weight yet more augments its advantages. This applies with greater force to cylindrical cases,

and is an important matter in any system, but particularly so in one like that of England, for instance, where the tidal range is from 10 to 20 feet with an average velocity of current exceeding 3 feet per second.

In the United States all known requirements are met by the employment of a spherical steel case, entirely without rivets or bolts.

Wire rope has supplanted other means of mooring, except in emergency, when the electric cable may be used; and all the parts, size and strength of case, weight and form of anchor, and strength of mooring rope are carefully adjusted to each other and to the conditions they are to meet.

The efficient mooring of submarine mines is one of the most troublesome and difficult functions of this means of defense, difficult not only in the actual work of planting them in the exact positions assigned, but even more so in maintaining them in these positions for long periods of time under the ordinary adverse conditions of strong currents, rise and fall of the tides and rough weather. The questions of "invisibility" and "retention at effective depth" are the ones which give trouble in places where the rise and fall of tide is great (*i. e.*, exceeds twelve feet). Many attempts have been made to overcome this difficulty, but as yet no really practical method has been devised, and in fact, the only way of overcoming it seems to be the crude one of arranging the *mine-lines* so that the mines in one or more of the *lines* shall always be at the right depth at every stage of the tide; the outer ones being in right position at low water and the inner at high water, so that the latter, though exposed at low water are yet protected by the outer ones, which are then at proper depth and invisible.

Major Ruck, R. E., proposes to obviate the difficulty by a method whereby the mine shall rise and fall automatically with the tide. The anchor is provided with a pulley, and to the mine mooring rope a length of chain, graduated in size and weight, is attached. The chain passes through the pulley and is secured to a counterpoise which consists either of a metal case open at the bottom or closed by a flexible diaphragm, or of a compressible waterproof bag completely closed and properly weighted. As the tide rises, the pressure on the confined air in the counterpoise increases; its volume and consequently its buoyancy decrease, and the mine rises until the equilibrium is again established.

The lessening pressure of the falling tide produces the opposite effect. It would seem that sea-weed which exists in most harbors, and the twisting of the moorings in tidal changes would cause this plan to fail. We must certainly know what mines are serviceable, and with Major Ruck's mooring this would hardly be possible.

In Bucknill's method of double mooring, intended to accomplish similar results, he plants the anchor with its wire mooring rope up current while the armored electric cable attached to a sinker forms the down current mooring, the mine, of course, being at the apex of the angle thus formed. "By this means observation mines large enough to be effective at all stages of tide can be moored below low water, and smaller mines can thus be moored in currents, where otherwise, their angle of swing would render them ineffective."

Tidal currents do not as a rule confine themselves to a single plane at all stages of the ebb and flood. On the contrary, they swing through widely different angles at different times. But unless the point of juncture of the two branch moorings be acted upon by a force nearly in the plane of the branches, no important reduction in the depression of the mine will result from their spread.

Experience has proved that the use of the electric cable as a mooring for permanent mines intended to remain long in position is hardly admissible. Faults in the insulation are sure to occur before any considerable lapse of time, and these would be difficult to repair in a double system of mooring. The planting of these mines in correct position would be tedious and difficult. Counterminers with their auxiliary sweeps and drags could hardly imagine a better system for their operations.

The class of mines offering the greatest trouble in planting is the combination buoyant mine, as each one consists of an anchor, a mine case and a circuit closer case,—and besides great accuracy of position is essential if they are to be fired by observation. Moreover, the mutual reactions of these two moving bodies under the torsional effects of currents would render the maintenance of this system in proper condition a matter of extreme difficulty.

The best ground mine cases are similar in form to the Confederate "turtle back," increased in weight and strength to meet the new requirements of serving as an anchor, resisting currents, and the shock of neighboring explosions.

XUM

The English seem to prefer a cylindrical case which lies on its side.

IV.

A defense like the Confederate, composed almost entirely of mechanical contact mines, dangerous alike to friend and foe, would be unsuitable for a government possessing a fleet. Development of electrical systems became therefore inevitable, for it is only by this means that the action of mines can be controlled and their condition ascertained.

The well-known defects of mechanical mines have in most systems occasioned their suppression even as auxiliaries. Electrical self-acting ones are now constructed so that the planting can be conducted with comparative safety. These contain a small battery so arranged, with or without circuit-closers, as to cause the immediate explosion of the charge if the mine goes adrift. This same class of self-acting mines may sometimes find useful employment in repairing injuries done to a regular system of electrical mines by countermining. To be of much value the passage opened by the enemy must be well marked and buoyed. A few self-acting mines dropped into this passage at night would prove extremely dangerous, and they are very easily handled and rapidly planted. They are also largely employed in closing channels not needed for use in harbors which possess more than one channel of entrance.

The immense advantage which the employment of sea mines may give is well illustrated by the operations of the Russians on the Danube, during the Russo-Turkish War, where these mines afforded protection to the Russian line of communications, their bridges over the Danube; they neutralized the Ottoman fleet of several armored ships and reduced odds which twenty years earlier would have been almost overwhelming.

Had it not been for the moral power of submarine mines the splendid navy of France would hardly have proved so utterly useless to the French in their hour of great need in 1870, and but for this dread of the torpedo and the mine the incapacity of the Turks to make full use of their immense superiority on the Danube and in the Black Sea would not have to be recorded. These Russian torpedoes could be made purely self-acting or "automatic at will" by supplying circuit closers and connecting the wires to a short station.

The advance made in electrical science since 1865 has added immensely to the improvement of torpedo processes. New methods of measurement and determination of electrical condition, the inventions and improvements in submarine cables and instruments of precision, and various mechanical details, have brought into existence greatly increased capabilities.

The rude "tongue-test" of the Confederates has given place to means, more or less complicated in different systems, for determining battery-strength, proper working of apparatus, leaks and injuries in cable and torpedo.

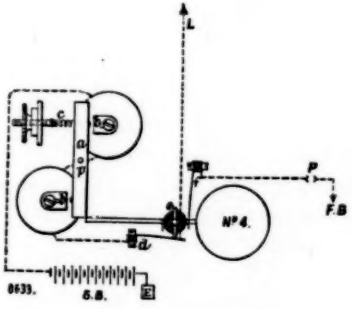
The Smith frictional, Laflin and Rand, Farmer and Gramme machines combine the excellences of this class of generators.

The advantages gained in voltaic firing-batteries, represented by the Leclanché, are, greater portability, convenience, and the quality of not sensibly deteriorating when out of use. The best systems have now three batteries instead of one. 1st. A feeble battery for testing, as this has to be done through the bridge of the fuse. 2d. A battery of the feeble and constant class for signalling any interference or contact with the mine. 3d. A firing-battery, which is only brought into play at the proper moment either by the automatic action of the signal battery or by the hand of the operator, thus combining great constancy and electro-motive force with little loss of power. To cause this action by which the signal battery switches itself out of, and the firing battery into the circuit, is the principal object of most automatic apparatus. In the United States it may be set to report if any of the mines or their cables be tampered with, and if desired, automatically fire flanking guns.

The plan usually pursued consists in placing a small electric current continuously on the mine line: when the circuit-closer in or above the mine is actuated by a passing vessel, this current increases by a decrease of circuit resistance, excites an electro-magnet on shore which moves an armature and a dropping shutter, and thus automatically closes the firing circuit, rings a bell, etc.

The automatic indicator or shutter here shown in elevation is the same in principle as the English service instrument, differing from the latter only in detail. These shutters, together with all the working parts, are attached to a piece of ebonite and arranged in sets of seven, each shutter corresponding to a particular mine and bearing its number. Plugs or switches are provided for dis-

connecting the signalling (S. B.) and firing (F. B.) batteries. An armature (*a*) pivots on (*p*) between two horns (*bb.*) of an electro-magnet. The lever of a weighted shutter (No. 4) engages the lower end of the armature so that when this armature is attracted by the electro-magnet the shutter falls and strikes a bell. This occurs when the line resistance is decreased by a contact made at the circuit-closer in one of the mines of the groups connected to line (L). The axis of the shutter is insulated and connected to line (L). The metal cross-bar (*e*) is normally in contact with the spring (*d*) which is connected, through the coils of the electro-magnet, with the signalling battery (S. B.). As soon as the shutter falls this spring (*d*) is automatically disconnected and the firing battery (F. B.) brought into play through the spring (*f*) and contact plate (*e*), provided the



plug (P) is in place. Should this plug, however, not be inserted the mine remains unexploded, the bell merely showing the fact of its having been struck.

The dielectric is changed to rubber and is protected with iron wire, which adding to the weight causes the cable to sink in the mud, making grappling much more difficult.

The high degree of permanency and uniformity of the fulminate of mercury platinum-wire fuse has caused its retention; better adjustment of parts, length and diameter of bridge, and more secure means of clamping the wires to the plug, are the main changes.

Where the signal battery acts in the manner above described, some precaution must be taken to insulate the end of a cable belonging to a fired mine, or the leakage would cause the auto-

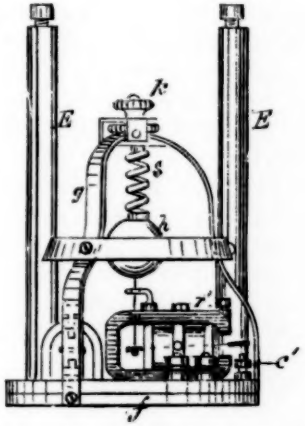
matic apparatus to act undesirably; this is accomplished by attaching at a break in the cable, a cut-off or modified fuse, so arranged in a water-tight case as to explode simultaneously with the mine and insulate the cable ends.

France retains a single-core cable extending to each mine, thinking thereby to avoid the danger of having an entire group cut out by the enemy. Others, however, have followed the English in the use of a seven conductor main cable which branches at a junction-box, into seven single-core ones proceeding to the mines. Most governments terminate each of these cables with a single mine. General Abbot has worked out a system of buoyant mines in which three cables extend from a second set of junction-boxes containing cut-offs, each box being connected to the principal junction-box by the usual single-core cables. Each of the three cables is terminated by a mine thus forming a "grand group" of twenty-one. Each one can be fired automatically singly, or each group of three all together at will; thus insuring greater certainty in judgment firing besides effecting a reduction in the number of parts, increased simplicity and less cost of cable. The efficiency of the whole system is increased by this mode of planting, and the use of the enormous charges, favored in France, and in other countries, avoided.

"For many reasons it appears desirable to cut the field to be mined by continuous lines with ample intervals between mines to prevent them from becoming mutually destructive when fired, and to fill the gaps between lines by single-cable mines admitting only of automatic action. Upon this system it is possible to thoroughly obstruct a large area of channel without increasing to an extravagant extent the total number of individual mines" (Abbot). "Mines which can be exploded only by judgment, at the will of an operator on shore, have a very limited application. At night, or in a fog or the smoke of a bombardment, or when several vessels are approaching abreast, or when the water is deep or the channel wide, the chances of failure are very great. Indeed, the destructive range of practicable charges is so limited that judgment-firing has become nearly obsolete for any but very narrow channels if the ship be constructed with double cellular bottom and water-proof compartments." This applies with greatest force to buoyant mines owing to their large angle of swing and consequent depression under the action-currents, and a ship might pass over the lines were it not for the

invention of an instrument called, according to its mode of action, a circuit-closer or breaker. These are of various forms, all having the same object—to report the contact of a vessel with any mine and fire it if desired. With ground-mines the circuit-closer, when used, is in a separate buoy and anchored either over or in the rear of the mine.

The Chatham (English) circuit-closer consists of a cylindrical envelope inclosing the circuit-closer instrument, the fuses and priming-charge. The circuit-closer instrument, occupying the lower portion of this cylinder, consists of an insulating base (*f*) supporting a tripod frame, from the apex of which is suspended an inertia ball by means of a spiral spring. On the base (*f*) are fixed two



Armstrong relays *r*, *r'*, placed at right angles to one another. Each relay consists of a horseshoe magnet within the inclosed space of which is placed a hollow bobbin of wire. The plane of the horseshoe is vertical. Extending through the bobbin and pivoted on the shorter axis is an armature or tongue. For the relay (*r*) this tongue has an upper and lower contact point, while that for (*r'*) has only a lower contact at the outer end. The relay (*r*) is wound with wire of 2,000 ohms resistance while (*r'*) has but five ohms. The inner end of the tongue of relay (*r'*) is attached, by a piece of silk thread, to the inertia ball, so that in the event of the oscillation of the ball, caused by striking the mine, the inner end of the tongue is pulled up, forcing the outer end down upon the contact point, thus closing that circuit.

The mode of connecting up the circuits differs, for *contact* and *at will* firing and is one of the so-called "secrets."

The principal object of the relay is for testing. By the use of positive or negative currents the armatures are attracted towards different contact points.

The instrument seems too delicate for the rough usage to which it must be subjected in submarine mining.

One other mine system requiring special arrangements has for its object to obstruct a restricted area available for occupation in conducting a bombardment from a distance. This is especially easy to do if the water be sufficiently shallow to permit the use of ground-mines.

"A few large and carefully located charges arranged preferably for judgment firing (so that their discovery by sweeping shall be made as difficult as possible) will reinforce mortar firing in a very effective manner.

"The system permits the use of cables too much deteriorated for automatic firing, and may have an extended application under certain contingencies."

Main lines of mines should be so arranged as to be swept throughout their length by the fire of flanking-guns. These guns, charged according to the range, should be trained by daylight to sweep their respective fields. They are so connected with the electrical system that any injuries to mines or cables at once draws the fire of guns laid to cover the injured point.

"The fundamental principles of defense involved in the employment of sea mines are more intimately connected with fortification than most people suppose. The position of the forts and batteries, of the mines and cables, of the electric lights, of the firing and observing stations, of the telegraphic and visual signalling, forts, etc., should form one harmonious whole."

"As no two harbors are alike, so no two arrangements of fortifications or of mine defense will be the same; but the same principles apply to all, and they do not differ greatly from the broad ideas that should underlie the preparation of every defensive position. But mining differs from fortification in one important particular. The value of sea-mining is greatly enhanced when the positions, or even the approximate positions, of the mines are unknown to a foe. Secrecy is therefore essential. Not concealment as to the efficiency of the apparatus employed, or the manner of its employment; but secrecy as to the waters

that are mined. Any artifice which ingenuity can suggest should be undertaken in order to deceive a foe on this score. Buoys should be laid which are otherwise useless; bogus mining operations should be ostentatiously conducted for the benefit of spies when time and opportunity are available; false reports concerning the mine fields should be spread; and some of the mines, especially those in advanced positions, may advantageously be laid at night if possible. When drawing up a design, the object of a foe, and the probable manner in which an attempt would be made to attain it, should be carefully considered. This object may be the destruction of a dock-yard or of a fleet at an anchorage. It may be the reduction of a sea-fortress, or the capture of a commercial city or of a coaling station. The attack may consist in a bombardment, or in forcing a channel at speed, or in ascending a river deliberately by '*force majeure*,' including perhaps land forces, as in the American War of Secession—and the defense in each case must be planned accordingly."

"A fortified dock-yard is not likely to be attacked by land by regular siege made for capture, unless as part of an invasion on a large scale; but a bombardment from land batteries, or from vessels up to perhaps 12,000 yards range, should be guarded against. However, neither ships nor land batteries can effectively bombard an unseen object even at much shorter ranges than 12,000 yards. Consequently, when hills screen a dock-yard from view, no position beyond them need be occupied. On the other hand, when ground exists within bombarding range and in sight of the dock-yard, measures should be taken to deny it to a foe."

General Lefroy once said that "when a fleet bombards, the opinion of naval authorities seems to be that the attacking vessels should anchor; if not, and they continue in motion, their distance from the object is constantly varying, much of their fire is thrown away, and they incur numerous nautical dangers," which now certainly include sea mines. But the operation of bombardment is a long one, lasting for many hours, during which the ships engaged in it would, if anchored, be more exposed both to the artillery and the torpedoes (locomotive) of the defense, than if the ships were kept in motion.

"Guns cannot be considered efficient against ironclads except at ranges of 3,000 yards and under. The forts should therefore be placed some 8,000 or 9,000 yards in front of the object to be

protected from bombardment. If this can be done bombardment is practically prevented, for the most powerful vessels would be much injured by modern rifled guns at battering ranges, and such injuries would necessitate protracted repairs after any conflict with forts, and it is highly improbable that a naval power would risk this loss of efficiency in a fleet at a critical time even for a short period, in order to bombard a dock-yard at long range. Sometimes, however, it is impossible to place forts so far to the front, and in such a case a zone of water will exist from which a fleet may bombard and yet be outside the effective battering range of the guns mounted in the forts. Under such conditions groups of large sea mines to be fired by observation should be scattered irregularly in this zone."

The protection of large commercial shipping centres is not difficult if they be situated up an inlet or river not easy to navigate at the best of times—New York affords an example.

"The position of the mine-fields in such a case should in general be retired from the open sea, both because they would then be more difficult to approach, and because the shelter would enable the miner to carry out the mooring operations in rough weather. Care, must, however, be taken to moor some of the mines at or a little beyond the limits of bombarding range, and the remainder should be scattered in groups or fields as irregularly as may be compatible with their protection by light artillery, and especially quick-firing guns mounted in proper emplacements."

"Absolute mine blocks, which are so fashionable, with their floating impediments telling a foe where the mines are laid, should be avoided. The method places too many eggs in one basket, and shows the position of the basket. A mine defense should be deep and narrow in plan, rather than wide and shallow; and the centre of each channel should be mined more than the sides."

Mines should extend right through the defense, to the very last intrenchment. Sir Lintorn Simmons once said, "A gun for the defense which can be reserved until the attack is in the last period is worth anything" (R. E. Papers, vol. xviii, 1870); and the same remark applies to mines. In a letter to the *Times*, 1855, signed "B.," and attributed to the late Sir John Burgoyne, we read, "one of the principal ingredients in defensive works is an obstacle to the approach of the assailants." On this principle

mines should be moored so as to help the forts when they are attacked, by obstructing those portions of the channel outside the forts at engaging distances.

"In conclusion, as regards submarine mining, it is important to remember that each harbor or place will form a special problem, and that the plans for defense by sea mines should be drawn up by an adept well versed in harbor defense generally and submarine mining in particular. The artillery defense must be carefully noted as well as the numerous local peculiarities of tidal currents, depth of water, facilities for navigation and other matters of this nature." *

* The compiler desires to make acknowledgment to the various works of General H. L. Abbot, Corps of Engineers, U. S. Army; to Colonel J. T. Bucknill, R. E., (Submarine Mines and Torpedoes, John Wiley & Son, No. 15 Astor Place, New York,) and to Mr. C. Sleeman (Torpedoes and Torpedo Warfare, Griffin & Co., The Hard, Portsmouth, England).

(*To be continued.*)

MACKENZIE'S LAST FIGHT WITH THE CHEYENNES: A WINTER CAMPAIGN IN WYOMING AND MONTANA, 1876–1877.

By CAPTAIN JOHN G. BOURKE, U. S. A.,

THIRD CAVALRY.

(Continued from JOURNAL No. 42.)

THERE we lay, afraid to breathe lest a cough or a sneeze should betray our presence; dreading the impatient champing of tired and frozen horses, or the echo awakened by the falling upon the ground of the carbine of some clumsy soldier.

"Sharp Nose," the Arapahoe chief, with dilated nostrils and flashing eyes, moved nervously from point to point on his wiry pony, looking the incarnation of the Spirit of War.

All the discontent and disquietude engendered during that night of cold and anxiety came to a head at that moment; our eyes nervously scanned the battlements behind which hostile sharp-shooters might within the next few hours be taking position. It might be our misfortune to have to fight our way back—who could tell?

There came a low, Hist! from the front where the Indian scouts had massed, impatiently awaiting the signal to dash forward. It was not long in coming. The rearmost company was reported "up." Every man was in place, every horse was pressing on the bit. Anything was preferable to another moment of suspense; the noise of the Cheyenne drums had ceased and Gallop! was the order.

I heard nothing more—all was rush and clamor and shock, but the rush and clamor and shock of thoroughly organized, pitiless war.

It was the rush of a mighty river, the roar of a giant engine, but each drop of water knew its destined channel, each element of the machine knew the function it had to perform.

Back from the walls of the cañon, repeated fifty-fold by the echo, sounded the sharp words of command, the neighing and plunging of excited steeds, the clatter and clangor of arms, the

ear-piercing shrieks and yells of savage allies, their blood-curdling war-songs, and the weird croon of the sacred flageolets of the Pawnee medicine men who, like the Celtic bards of old, rode boldly at the head of their people.

The Shoshonees and Bannocks followed Tom Cosgrove and Lieutenant Schuyler; Frank North led the Pawnees—these two detachments on the left and right flanks respectively, while down the centre thundered the solid column of Sioux, Cheyennes and Arapahoes, under Lieut. Philo Clark, a brave and brilliant cavalry officer, now dead, and Lieut. Hayden Delaney, who had faced the leaden tempests of twenty-eight pitched battles before he gained his cadetship, and yielded the palm of valor and coolness to no man in the Grand Old Army of the Tennessee, not even when U. S. Grant was its commander.

The cañon widened within a couple of hundred yards, forming an amphitheatre, giving room for our battalions to gallop front into line before sweeping across a small plateau alongside the village whose scores of lodges hugged the shelter of the stream-bed.

As our soldiers, red and white, rushed in at one end of the village, the frightened Cheyennes, tumbling half-naked from their beds, with nothing in their hands but rifles and belts of ammunition, were escaping from the other. In the exultation of the moment our people forgot the cold, the sleeplessness, the fatigue and hunger of the two previous days, and made the rocks resound with their cheers and shouts of derision. The Cheyennes answered never a word. They hurried women and children to places of comparative safety farther up the flanks of the mountains, and then crawling into sheltered nooks and crevices awakened the echoes with the sharp crack of rifles and the ominous ping! of bullets, each seeking its billet. Under cover of this fire, they perfected arrangements for the safety of their households, but reserved further demonstrations until a few bold youngsters stealthily creeping back through the mist of early morning should have driven out of our clutches the herd of several thousands of ponies, hundreds of which were already enveloped by our lines. Several of their warriors had already been killed or wounded in an endeavor to save this precious stock, and I may say that one of the most vividly remembered episodes of the whole affair is the balking of my horse at the stark and stiffening body of a dying Cheyenne boy who lay directly across my path shot through the neck as he was

bravely trying to stampede the ponies in the very teeth of our scouts. Wound loosely about his neck was his lariat; no doubt in my mind, that he had slept with it around or beside him, ready to spring out of his bed and rope the first pony he might run against in just such an emergency as this in which he had yielded up his young life to a sense of duty worthy of any Spartan.

But crawling in behind rocks and bluffs, dodging from tree to tree, and sneaking back among the tépis of the village itself, the bold, cunning Cheyennes were making ready to fight for their herds and drive us back down the cañon. The mist had lifted and the light of morning was filtering down into the cañon. The movements of the enemy were detected and General Mackenzie, realizing that not a moment was to be lost, ordered Lieut. John A. McKinney, with his company "M" of the 4th Cavalry to charge into the place where the enemy appeared to be concentrating. The brave young officer never faltered an instant, but charged across the plateau and down upon the Cheyennes, until he came to a gully with "cut" banks, which completely checked his advance. As his little command was wheeling by fours to the right to pass this obstacle, a small party of the hostile sharpshooters, concealed in and around the gully, and almost under our horses' bellies, opened a murderous fire, beneath which poor McKinney fell, struck by six bullets, six of his men wounded and a number of his horses shot. The company was thrown into confusion and several of the sets of fours turned in retreat. Mackenzie had observed the unfortunate turn of affairs and another company—that of Captain John M. Hamilton, 5th Cavalry, being at hand, he ordered it to the rescue, Major G. A. Gordon, 5th Cavalry, accompanying this charge with some men of the 4th and 5th not belonging to Hamilton.

The Cheyennes were unprepared for this second onslaught, which being most vigorously pressed, drove them back in confusion. Davis of the 4th Cavalry, coming up on Hamilton's flank followed in after the Cheyennes and boldly attacked them in the rocks and gullies where they tried to make a stand. This was the hottest part of the fight, and both Davis' and Hamilton's men had hand to hand fights with the savages; twenty of the bravest warriors of the Cheyennes bit the dust, and eight of their bodies fell into our hands. From all sides the enemy began closing in upon Davis, and would, I am certain, have wiped out both him and Hamilton, had it not been for the masterly judgment shown by

Lieutenant Schuyler who had ordered his Shoshonee scouts to make their way to the summit of a very steep crag which commanded the village, the plateau and the whole position, and was, in fact, the key-point. The joyous yell of the Shoshonees proved that they recognized the value of their success; half of them began a demoniacal dance of triumph to the music of the Cheyenne war-drum, captured on the ground where it lay just outside of the village; shrieks of joy almost drowned the roar of the volleys their more sagacious, but not a bit more blood-thirsty, comrades were pouring in upon the discomfited Cheyennes.

Mackenzie realized that the day was won, but he did not let the grass grow under his feet in taking every measure necessary to secure the fullest fruits of his victory. Hemphill of the 4th and Hamilton of the 5th, were ordered to seize and hold two high knolls on our right, and thus prevent any portion of the enemy from slipping in behind that flank and annoying us by a cross fire from the rear.

Captain A. B. Taylor and Lieutenant Wheeler, 5th Cavalry, made a gallant charge lengthwise through the village, forcing out the last lurking sharp-shooter and occupying the small fringe of timber just beyond the village, while Frank North and the Pawnees, darting in under cover of Taylor's movement, filled the village itself.

Russell and Wessells, with their companies of the 3d, covered the line between Hamilton and Taylor, while clusters of Arapahoe and Sioux marksmen held every clump of bushes, every projecting rock and every eminence along our whole front.

Three companies of the 4th, one of them McKinney's, were held in reserve behind protecting knolls, a short distance to the rear.

The day was won, and no one saw that better than did the Cheyennes. They could not retire from our immediate front with their women and children, because that would precipitate an attack and entail further loss. Their policy was to hold on to their natural fortifications in the high rocks, from which we could not dislodge them, until night-fall, and then withdraw with their families, their wounded and dead to some locality impregnable to assault.

Our men were peremptorily ordered to lie down under cover and to waste no ammunition. There were paroxysmal volleys from one side or the other, but the losses suffered were trifling,

and so far as the Americans were concerned there was no great amount of danger, shelter being adequate, except in the cases of aides-de-camp, orderlies and officers reporting for instructions who, in moving from one flank to the other, if not able to hug the cover of a favorable ravine, were compelled to ride full tilt, exposed to a more than generous share of leaden attentions from Cheyenne sharp-shooters.

One of our soldiers met with death in a rather curious way. He disregarded his orders, and lifted his head and shoulders above cover. Hardly had he done so before a Cheyenne rifleman had drawn bead and put a bullet through his jaws; knocked senseless by the blow, he fell forward, but still remaining on his feet, against the bank in front of him. The blood from his wound poured down his throat and choked him to death. Had he fallen head downward, the blood would have flowed out from his mouth, and his life, perhaps, been saved, as the wound was not necessarily a fatal one.

To dispel the monotony, numbers of the Cheyennes rode out under the fire of our Shoshonees and others, hurled their contempt and defiance at them, and then returned to their own lines.

There was something peculiarly irritating in all this to the Shoshonees, between whom and the Cheyennes a special hatred seemed to exist. The cañon became a perfect bedlam with the echoing and re-echoing of rifle volleys and the yells and counter-yells of exasperated savages, but through it all the Cheyennes would dash about on their war-horses, chanting their songs, and bearing charmed lives whose frail thread the fickle Fates disdained to cut.

There was one notably daring warrior or chief, a powerful looking man, riding a fine white horse and himself bearing on his left arm a circular shield of buffalo hide and upon his head a war-bonnet, whose pendant eagle plumes swept the ground at his horse's feet. Bullets struck the ground before him, behind him, beside him; the air groaned with the ominous whistle of Death's messengers, but each and all spared the grim Cheyenne who serenely rode along the front of our line, venting derision in the teeth of his foes, until the cool, deadly aim of Lieutenant Allison, of the 2d Cavalry, knocked him lifeless from his charger.

Before the cheers from the whites and their Indian allies had died away, there issued from the Cheyenne line a young warrior

gorgeous in his decorations of feathers, mounted upon a spirited pony, and bearing also upon his left arm a shield of buffalo hide, hardened in the fire and decorated with the plumage of the bald-headed eagle. This brave Cheyenne charged recklessly into the face of death, scorning the bullets which made the air hot about him, and chanting loudly the war-song proclaiming his determination to save from profane hands the corpse of his comrade and friend. On he flew, whipping into more energetic movement the faithful beast whose instinct warned it of imminent peril. Much sooner than it has taken to write this paragraph, he was bending over the bleeding form of the red-skinned Ajax, whose defiance was still sounding in our ears. Many were the expressions of admiration from our side as he lifted the body across the withers of the pony, and then springing lightly into the saddle, plied vigorously the quirt (or Indian whip of leather) and turned back to regain the friendly shelter of the rocks and gulches.

Escape seemed secure, but Fate was only mocking the poor wretch. In War, business is business, and bullets must fall upon the just and unjust, the cowardly and the brave.

Almost within hand-shake of his people, the heroic Cheyenne and his sturdy pony, freighted with so precious a burden, bore testimony to the precision of our marksmen, and fell pierced with many wounds. They had been comrades in battle and in campaign; and in death they were not divided. "Greater love than this hath no man than that he lay down his life for his friend."

The existence of this battle-comradeship among North-American tribes is a well-ascertained fact. The incident just described was one of many coming under my notice, not on this occasion alone, but at the fight on the Rosebud and elsewhere; it is more apparent, perhaps, among the Plains' tribes, but can be found among the Bannocks and others on the west of the Rockies.

There was a lull in the action for a few moments to allow Bill Roland and a small party of half-breeds and Cheyenne scouts to crawl up closer to the enemy's position and begin a parley. At first the enemy were disinclined to a conference, and were more desirous of showering bullets than compliments upon their interrogators. Curiosity conquered antipathy, however, and enough of a conversation was had to let us know that "Dull Knife" and "Little Wolf" were the chiefs in command. The former, with

two companions, approached near enough to let Roland know that he had had three sons killed in the fight and was personally willing to surrender, but unable to influence "Little Wolf," "Roman Nose," "Gray Head" and "Old Bear," who were all present with the village. These Indians called out to our Indian scouts: "Go home, you have no business here. We can whip the white soldiers alone, but can't fight you, too."

Then others of the hostile Cheyennes approaching, called out that they were going over to a big Sioux village they asserted to be near by and get its assistance and come back and clean us out. "You have killed and hurt a heap of our people," they said, "you may as well stay now and kill the rest of us."

The talk of the Cheyennes was still fierce enough and their courage was unabated; had we foolishly attempted to force them out of their improvised rifle-pits in the crevices and behind the rocks on the hill sides, the loss of life would have been fearful. Prudence suggested that we make sure of what we had gained, move off all the herd of ponies rounded up by our Indian scouts, burn and destroy every vestige of the village, and send back to General Crook for the infantry with a view to having them bring their more powerful rifles to bear upon the hostiles in the morning in case they did not withdraw to another position during the darkness of night.

Our own losses were of course known: one commissioned officer (McKinney), six enlisted men killed; and twenty-six wounded. Thirty of the Cheyenne dead fell into our hands; sixteen scalps were taken, by Pawnees and Shoshonees; the other scouts did not take any, respecting the wishes and prejudices of the white soldiers about them. The full loss of the Cheyennes was never determined until their surrender at Red Cloud Agency, Dakota, a number of weeks after, when they submitted a list of forty killed, but never stated the number of wounded, either on account of superstition or some undefined repugnance to dwelling upon the topic.

Not the battle-field alone was unkind to them. From the desperate cold of the night immediately following they suffered as much. Eleven little babies froze to death in the arms of famished mothers, and ponies had to be killed that feeble old men and women might prolong their lives by inserting feet and legs in the warm entrails. This night was of unusual severity: the spirit-thermometers in our supply camp registered almost, al-

though not quite, 30° below zero. These facts were not learned, as I say, for some time after the fight. I prefer to introduce them here to make the story more coherent. It was always a difficult matter to get any of them to speak of their frozen children, or to name their dead. (An American Indian will never, except under the pressure of a grave exigency, mention the name of his mother-in-law, or of a friend who has lately died.) The gashed legs and arms of mourning widows and orphan girls were about as good a sign as any one could demand of the extent of their loss and the depth of the grief it had provoked.

The destruction of the village would have been a veritable triumph for us, without the killing or wounding of a single Cheyenne. Never had so rich and complete a prize fallen into the hands of the Regular Army from the day of its first organization.

Two hundred lodges,—nearly all of canvas, but a considerable percentage of buffalo hide,—were, each and every one, a magazine of ammunition, fixed and loose, and a depot of supplies of every mentionable kind.

A few, not more than half a dozen at most, were of extra large size, and filled with saddles and war-like trappings ranged round the circular floor; these were the convention halls or lodge rooms of the "soldier" societies; others, petty in dimensions, were allotted to women living in seclusion.

Not infrequently, artistic taste was evident in pictographs upon the hide or canvas walls; and where the head of a lodge was a person of importance, his shield, ornamented with his "totem," and "medicine," was suspended from a post or a tree-branch in front of the entrance.

Soldiers detailed upon a work of destruction have no time for indulgence in the contemplation of the æsthetic development of savages; a great task had been assigned us, and all that night and well into the next morning, Russell's troop of the 3d Cavalry and Davis' of the 4th toiled and burned, wiping off the face of the earth many products of aboriginal taste and industry which would have been gems in the cabinets of museums.

First, all the fat and marrow preserved by the squaws in great bladders and paunches were laid upon the lodge-fires, upon which were then piled the cords and cords of fuel gathered as the winter supply. The crackling flames roared and bellowed in their skyward rush through the covering of hide and canvas, but be-

fore the lodge-poles could fairly ignite, the explosion of kegs and cans of powder sent all the belongings of Cheyenne domestic life rocket-like to the zenith.

Never were orders more thoroughly executed. Experience had taught us in bitter lessons the preceding winter that villages only half destroyed were scarcely to be considered injured at all, and on this occasion the determination was to let not one square inch of canvas, of hide, of robe, or even of gunny sack be available for future use by the discomfited enemy.

Lodge-poles, not more than half burned, were broken into smaller fragments and thrown upon what it is no rhetorical flourish to call the funeral pyres of Cheyenne glory. Axes, spades, picks, shovels, hammers, scissors and knives were burned to deprive them of their temper: holes were knocked in the bottom of canteens, kettles, pans and all other utensils, before subjecting them to heat; saddles were smashed, bridle-reins cut, bits broken, and then thrown to the conflagration.

Many weapons of excellent make were seized and these were exempt from the common fate. Seven hundred head of stock fell into our hands, not quite one hundred of the number being loaded by our Pawnees with such plunder as appealed to their fancy.

How many tons of buffalo-meat were consumed, I couldn't pretend to say; when we took possession of the village we found immense stacks of it aggregating thousands of pounds and sufficient to last the enemy until spring; we didn't stop to estimate its amount, but promptly tossed it in alongside of blazing saddles and steaming fat, to add its quota of crackling noise to the detonation of bursting ammunition.

That this band of Cheyennes had been in the very thick of the fight with Custer was evident to the least discerning and increased the zeal which pressed us in our exertions.

As we watched the untanned buffalo skins, the robes and blankets baking to a crisp; or threw in alongside of them bottles of strychnine used by the Cheyennes to poison wolves, or bullet moulds and empty cartridge shells, useless to us, but priceless at this time to the enemy, there fell at our feet all the Lares and Penates of primitive man, with a liberal contribution of much that the taste of civilization could devise or its art and industry fabricate.

First, let me enumerate the principal features of the evidence implicating this particular band in the Custer Massacre.

A pillow-case made of a silk guidon of the 7th Cavalry.

A Guard Roster of Company "G," 7th Cavalry.

Memorandum books of the First Sergeants of the 7th Cavalry; one of these had in it an entry made the very day of the massacre: "Left Rosebud June 25th." This had subsequently been used by a Cheyenne warrior to contain the picture-history of his own prowess. On one page, he was to be seen murdering a poor teamster; on the next, he was killing a wretched miner. At one point, he was running away from Reno's barricade on the hill (represented by a round line of fire, with saddled horses lying down inside), amid a hurricane of bullets; in this rencontre, the Cheyenne represented himself wounded once and his horse four times. (This trophy is preserved in the Museum M.S.I.)

Cavalry horses branded U. S. and 7C.

Saddles, canteens, nose-bags, curry-combs, brushes, rosters of companies, shovels and axes—all marked with the letter of the company in the 7th Cavalry, to which they had belonged.

A book containing the names of the three best shots at each target-practice of Captain Donald McIntosh's company, 7th Cavalry.

An officer's blue Mackintosh cape.

A buckskin jacket, lined with taffeta, supposed from its marks and appearance to have been worn on the fatal day by Captain Tom Custer.

A gold pencil-case.

A silver watch.

Pocket-books, containing currency and coin. "Sharp Nose," the Arapahoe chief, in rummaging about in the tents, was the delighted discoverer of a wad of greenbacks containing not quite fifty dollars.

The hat of Sergeant William Allen, company "I," 3d Cavalry, killed in the fight of June 17th, 1876, with Crook's forces. (Identified by name on the band.)

Letters received from relatives at home and letters written and ready to be mailed; one to a young lady in the East had a stamp on it and everything ready for mailing.

Photographs, one of which I pasted in my note-book, where it still is. Among these, were also found: A full cartridge belt, with a silver plate, marked "Little Wolf," presented to this Indian when he was visiting Washington. This was taken from the body of a dead warrior to whom "Little Wolf" had given it, or who had won it from "Little Wolf," in gambling.

The scalps of two young girls, neither of full age; one a flaxen-haired Caucasian; the other, a Shoshonee.

A buckskin bag containing the right hands of twelve Shoshonee babies.

The hand and arm of a Shoshonee squaw.

The scalp of the Shoshonee warrior killed on our side at the Rosebud, June 17th; recognized by his friends by the ornaments in the hair.

A necklace of human fingers. This ghastly specimen of aboriginal religious art, the especial "medicine" decoration of "High Wolf," the chief "medicine-man," can be inspected at the National Museum, Washington, D. C., where it was deposited by me last year.

Scalp shirts, fringed with human hair, savage and civilized.

War bonnets of eagle feathers.

Shields.

And many other specimens of dress, art and manufactures.

Many of the squaw's robes of delicately tanned antelope skin, encrusted with bead-work, or stained porcupine quills, or glistening with the nacreous lustre of elk teeth, were marvels of beauty.

The Cheyennes were not unmindful of the creature comforts. Plates, cups and saucers of china-ware; spoons, knives, forks, scissors, coffee-pots, pillows, even mattrasses, showed that the presence of the white man was beginning to develop new wants, excite new appetites. Alongside of these, were the primitive forms of implements—stone hammers and fruit and nut mashers for making the palatable compound known to the Sioux as "Toro," in which powdered buffalo meat, wild plums, and, occasionally, wild cherries, are beaten to a pulp and incorporated with boiling marrow: stone pipes, sometimes inlaid with silver, and at other times without ornament, but always accompanied by tobacco-bags, most elaborately ornamented with bead and quill work.

There was little sleep for our people throughout that cold, frosty night; the Shoshonees, half-crazy with grief, gave full rein to their sorrow in weeping and singing, weirdly monotonous, but deeply impressive.

They reasoned, and subsequent events proved they reasoned wisely, that the Cheyennes had just returned from the destruction of one of the outlying villages of their tribe, in some ex-

posed position in the Wind River range, and that we had been listening to the savage dance which celebrated this fearful butchery. All sympathy was rejected; they surrendered themselves to the most abject grief, and letting their hair hang down over face and shoulders, danced and wailed, and wailed and danced until darkness had passed away, neglecting to assume the new battle-names which the Pawnees alongside of them adopted, according to the usage of the Plains' tribes, with much smoking and other ceremonial.

There was no shooting into our lines during the night, and when morning dawned on the 26th, no enemy was in sight, but a reconnaissance made by our Indian scouts developed them in a strong position six miles distant. No hostile demonstrations were exchanged and the day passed without incident.

Another dead Cheyenne was found in the rocks, and four other dead ponies were come upon, killed by our fire, and the skeletons of six butchered by the starving Cheyennes for food.

The column was ordered to saddle and move back to rejoin the infantry. As the march was taken up it began to snow heavily. Two or three Cheyennes entered their ruined village almost the moment our men had withdrawn and sat down and bewailed the spectacle of their desolated home. They were not molested. They were, of course, not a bit more afflicted than the others of their tribe, but possibly represented them all. Examples of just such Ceremonial Weeping I have seen at the Rosebud, at the Sun Dance and elsewhere. It was an observance known to the Hebrews, who, "by the waters of Babylon" "sat down and wept," and to other nations. We marched not more than twelve miles, the day being very cold, and our wounded needing careful attention. The bodies of our dead, frozen hard, were slung over the backs of pack-mules, which at first were restive and frightened, but by the end of an hour or so became reconciled to their ghastly cargoes.

The wounded were our greatest care. Lodge-poles, reserved from the destruction of the village, were arranged one on each side of an aparejo, the ends trailing on the ground, and blankets or gunny-sacks made fast in the manner of a cot or litter, in which the patient was placed, warmly wrapped, and thus dragged along the frozen soil.

The route became very slippery from the impress of hundreds

of hoofs; and, where intersected by deep ravines, almost impassable for these "travois." In one particularly bad place the frightened mules had to be pushed over the edge of the declivity, and allowed to slide down, sustained by stout ropes held by the enlisted men, and the ends of the "travois" supported in like manner.

And when we reached Willow Creek, which we crossed before going into camp on the other side, the extremities of the "travois" poles were secured in the bight of a rope, held by men on horseback riding alongside.

The beneficial effect of "travois" travelling upon the health of wounded men, is due, it seems to me, to the absence of jolting and the fact that, in every position the sick man's head is higher than the body.

A detachment of our Pawnees and Shoshonees who had gone on a reconnaissance to develop the enemy's position, and, if possible, determine his intentions, rejoined us during the day. They succeeded in getting in upon the remnant of the Cheyenne herd and were making off with over one hundred ponies, when their presence was discovered, and had it not been for the providential interposition of a dense snow-storm, their lives would have paid forfeit for their temerity. They escaped with a few of the ponies and the information, highly appreciated by us, that the Cheyennes seemed badly cut up, almost naked, without blankets, moccasins or ammunition, and hauling many wounded in the direction of the head of Crazy Woman's Fork of the Powder.

There was a wounded Shoshonee—"Anzi," by name—shot through the intestines and marked, so our surgeons said, for death. It was really no use trying to save him and all that could be done was to give him as much whiskey as he wanted, with a trifle of morphia.

Anzi's thirst for whiskey was very much like a New York alderman's thirst for "boodle;" the more he got the more he wanted. The medical panniers were emptied for him and the last drop poured into his mouth, to his inexpressible pleasure; but finding that no more was to come, with many an imprecation upon the "Mellican Medicine-man," he rolled out of his "travois" and was assisted to the back of a pony which he rode all day. He basely went back on the doctors' predictions, returned with his people across the mountains, nearly two hundred miles of travel, and when I saw him at Fort Washakie, dur-

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ing the Nez Percé campaign in the following year, he was still living, although by no means, so his friends told me, the man he had been before being so terribly wounded.

The remainder of the march back to the supply camp was almost featureless. One of our wounded men, a brave soldier named McFarland, died on the 28th of November, and the same day we had to face another rather stiff snow-storm with the usual polar breeze.

General Crook, with Colonels Dodge and Townsend with the infantry and artillery, had made a forced march to join us, overcoming every obstacle of cutting wind, driving snow and frozen trail, marching night and day continuously until the head of our column was sighted when they took the back-trail to the supply-camp.

The Commanding General's telegram to the War Department announcing Mackenzie's fight contains the following paragraph: "I can't commend too highly his brilliant achievements and the gallantry of the troops of his command. This will be a terrible blow to the hostiles, as those Cheyennes were not only their bravest warriors but have been the head and front of most all the raids and deviltry committed in this country."

A reply to this reached us in a few days, Sheridan saying: "It gives me great pleasure to transmit to you the following dispatch from the General of the Army, to which I add my own congratulations." And Sherman to Sheridan: "Please convey to Generals Crook and Mackenzie my congratulations, and assure them that we appreciate highly the services of our brave officers and men who are now fighting savages in the most inhospitable regions of our continent. I hope their efforts this winter will result in perfect success and that our troops will hereafter be spared the necessity of these hard winter campaigns."

Thanksgiving Day, November 30th, 1876, was devoted to the mortuary services of all our dead, excepting Lieutenant McKinney, whose body, enclosed in a pine box, was forwarded under charge of Lieut. O. L. Wieting, 23d Infantry, to Memphis, Tenn.

The graves were excavated on the summit of a low terrace and arranged side by side.

There was no gorgeous ritual, no solemn chant, no peal of cathedral organ or sad refrain of cathedral bell, but more tenderly imposing than all these was the funeral procession of over six

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hundred weather-beaten veterans, headed by Generals George Crook, Ranald Mackenzie, Colonels Dodge, Townsend and Gordon, with the members of their Staffs, and the hundreds of savage auxiliaries—which moved with measured tread to the place of sepulture and there halted until the extracts from the Book of Common Prayer had been read.

The usual funeral salute was fired, and then the bugles sang "taps" and our heroes were left to sleep their last sleep undisturbed.

The expedition next worked its way down to the Belle Fourche and the country at the extreme head of the Little Missouri. On the 1st of December, Sergeant Patterson of Captain Hemphill's company, 4th Cavalry, was killed by having his horse slip under him on the icy ground, the shock rupturing a blood vessel inside the Sergeant's body, producing instant death.

On the 3d of that month, our Shoshonee guides after full consultation with General Crook, made up their minds to return home and look after their people, being still apprehensive that some great disaster had overtaken one of their villages, as proved afterwards to have been the case. Our parting with them was such as would take place between brothers bound together by the ties of dangers conquered and elements defied together.

The wounded and sick, with the horses that had begun to play out were ordered back to Fort Fetterman, under command of Colonel Gordon, an officer whose memory will not fade among his comrades so long as gallantry shall be held in honor, or genial wit and good-fellowship be looked upon as worthy qualities in a soldier.

It is hardly worth while to repeat scenes of distress and discomfort; my readers must by this time have come to the conclusion that we were not on a summer picnic. Almost every day a fierce blizzard paid us its respects, and nearly every night saw us bivouac in some spot where water was scarce, alkaline and muddy; fuel scanty and poor; in fact, but grease-wood and sage-brush. At the rise of the "Little Powder" we had to use water from a "water-hole" swarming with wriggling worms. We boiled the fluid but made as little use of it as possible, fearing results such as happen in Guinea, under the same circumstances.

Of food for our men there was no lack; the pack-trains carried a sufficiency of rations, and back with the wagons more

ample supplies were always to be had. The occasion of anxiety was the forage for the animals; even with every wounded man and every broken-down horse culled out, and one hundred Shoshonees ordered back to their homes, there were needed thirty thousand pounds of grain per diem, and grain we had to have, the ground being mantled with snow, and grass not always accessible. 500,000 pounds had been accumulated at Fetterman, as much at Reno, and 300,000 pounds every fortnight were to move from the railroad to Fetterman, there to await such orders as might be sent in, but the dispatches received about December 10th from Colonel Carleton, 3d Cavalry, commanding Fort Fetterman, were decidedly discouraging. The severe storms of snow and wind had blockaded the Union Pacific Railroad, choked up "Medicine Bow" Gap, and made travel for wagons almost an impossibility. The companies of cavalry left at Fetterman had been dismounted and the horses put in carts, wagons and every kind of wheeled vehicle to hurry forage to the front, and yet the supply was inadequate, and it seemed as if many of our poor horses were fated to pave with their bones the trail we had followed.

The human beings had no cause to complain; my notes record that on December 9th no less than seventy-five elk, deer, antelope and big jackass rabbits were killed—and there are occasional references to porcupine—altogether enough to make a toothsome addition to the components of the army ration.

Frank Gruard, our chief scout, Ben Rowland and others, helped me as much as possible in getting together vocabularies of the Arapahoe, Cheyenne, Pawnee and Sioux languages.

I was not ignorant enough to give the slightest credit to the sensational story set afloat by Burton, the English traveller, to the effect that the Arapahoe dialect was so meagre that for purposes of conversation the members of that tribe had to rely upon the "Sign Language." This statement had been quoted by E. B. Tyler in his "Early History of Mankind," a work I had with me, and it was therefore proper to verify or refute it. It took a very small examination to satisfy me that the Arapahoe tongue was copious, and, if deprived of its guttural and nasal modulation, would not be without beauty and softness.

The Cheyennes followed upon our trail and made two attacks upon careless parties of miners; in the first instance, no harm was done, but in the other, the results were very serious. There were

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eleven miners, who feeling a false security from being so near our camp, concluded to go to sleep without posting sentinels, at the coal-measure where Major Furey had had his blacksmiths at work during the day shoeing the mules of the wagon train. The attacking party of five Cheyennes was bold in its onslaught. A volley was poured in among the sleeping miners, none of whom was hurt, with the exception of one brained with his own axe. All the horses, blankets, guns, ammunition and provisions left behind by the miners in their flight fell into the hands of the Cheyennes.

Information reached camp shortly before midnight; a squad of Pawnee scouts was dispatched at once, but, beyond developing the above facts, was unsuccessful in pursuit. The Cheyennes had broken into small fragments, the better to obtain food in the chase, and also the more successfully to elude pursuit. Whether it was the party just spoken of or some other, I can't say, but we were informed a few weeks after at Red Cloud Agency that a couple of the Cheyennes had crept up to within ear-shot of one of our camp-fires and satisfied themselves that we really had a good-sized detachment of their own people among our auxiliaries; during the fight they refused to believe that there were any Cheyennes on our side save Bill Roland and may be two or three half-breeds. This was the last straw; they saw that further resistance would be useless and acted upon their convictions by surrendering at Red Cloud Agency. On the 20th of December the very unwelcome news came from General Sheridan that our expenses for "transportation," etc., had exceeded a monthly average of $60,000, while the appropriations would not admit of more than $28,000 being spent. This was tantamount to an order to abandon the campaign. Our horses and mules were doing their best on half-rations, but couldn't do that very long if we were not to be able to hire transportation to supply them with food. The expedition was at that time on the Belle Fourche, on the N. W. corner of the Black Hills; from that point, it slowly worked its way back to Fetterman, there to disband until the advent of spring should enable the animals to derive some nutriment from the grass.

Antelope and elk were seen at intervals and some brought down. The Indians imparted their ideas on the subject of cookery. A few of their dishes are not by any means unpalatable. An elk heart, boiled in salt water is good enough for anybody. Ante-

lope liver, sliced thin, laid on hot embers until done on both sides, is extremely appetizing. A deer or antelope head, roasted in the ashes, is toothsome, and some of the preparations of buffalo entrails, cooked in the same manner (which, however, we had eaten during the preceding summer and winter, and not on this expedition) were savory and palatable. My scientific enthusiasm did not sustain me to the pitch of trying the half-melted liver of an elk which had been chased over half a county and upon which liver there had been sprinkled a pinch of gall: I couldn't try that, but I did share in a handful of elk-liver, fresh from the animal, and found it to taste very much like a raw oyster. Despite the arctic temperature, which began to tell on the mules and horses, some of which would be found stiff and glassy-eyed each morning, and upon officers and men, among whom the surgeons found sufficient employment for their leisure moments in treating frozen feet, hands, ears and noses, the Indian scouts, constrained by a sense of duty which didn't allow them to wait for an invitation, gave the camp a serenade almost every night. First, the Sioux serenaded the Pawnees, danced for them and made presents of horses; the next night the Pawnees sang, danced and gave the old crow-baits back. Ditto, the whole business for the Arapahoes; ditto for the Cheyennes. Then the Arapahoes, fired by enthusiasm, went over the whole programme with the Sioux and we had to endure another round of dittoes. Nobody growled about that; we were assured it was a ceremonial observance among our aboriginal friends and having been paid to cheerfully suffer all such little privations, we made the best face we could over the matter and smiled through our tears.

It took us very little time to discover that the gentle savage is as full of tricks as Adelina Patti.

Just as we were getting ready for a real good honest sleep, the Pawnees started in on a Farewell Tour; the Sioux, not to be outdone, and "in deference to the urgent request of many patrons, kindly consented to appear for this night only;" and the Arapahoes "yielding to the importunate demands of a clamorous public had cancelled important European engagements in order to, etc., etc., etc." We managed to live through it all. It was a very gloomy season in our lives, one I would gladly bury in oblivion.

Judge of my feelings when I say that one of the first things I was asked in Washington was to write a treatise on Indian music!

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The weather grew colder and colder. To save our animals as much as possible they were not tied up at night, but allowed to run round unrestrained for the double purpose of keeping themselves warm under the shelter of friendly knolls, and of getting such nibbles of grass as might be found in sheltered spots not covered by snow. Wherever we could provide it, cottonwood foliage was fed to the mules; it is bitter, but not unpalatable, and much used by the Indians for their ponies in winter.

The sharp cold air of these winter mornings had the effect of intensifying the profane powers of our packers and teamsters whose language is quite often as amusing from its originality as it is shocking in its blasphemy and irreverence.

Whack! goes the whip, and ——— ! ——— ! ———! comes a torrent of objurgation from the irate mule-drivers. The mule's long ears catch the stream of unsanctified music floating through the air which warns him that "business" is meant. So he begins to tug in dead earnest on the traces, and with the encouragement of another crack or two from the "black-snake," and another string of expletives, succeeds, with the help of his comrades, in pulling the wagon through the mud-hole or snow-drift in which it has mired.

This is an outline description of their behavior under ordinary circumstances. In the presence of graver difficulties, they become appalled and not even the encomiums of the mule-drivers can induce them to advance one foot before the other.

Suppose the wagon at the foot of a steep acclivity, the ground incrusted with ice or frozen snow. The "leaders" look upward and see the case is hopeless. They consult with each other. Mules are the greatest animals in the world for consulting together, and when the driver of a team sees his animals turning their heads towards each other and about to begin a conference, he at once abandons the struggle in despair, altho' he usually cracks his whip half a dozen times and explodes in a volley of objurgation, by way of dignified retreat. The next step is to send for the pioneer party which loses no time in breaking into the sandy ground, frozen hard as flint by the inclement winds. After a footing has been picked out and dug out for the mules, long ropes are attached to the wagon-tongue, and strong hands take hold and pull, while hands equally strong seize upon axle and wagon-body and push with might and main.

The mules may still refuse to stir a hoof; the genuine army mule

loves to be coaxed, and if the driver be not a fraud now is the opportunity to demonstrate that his wages have not been paid him in vain. "Whoop! Whoop-la! Gee! Gee! You Puss-mules! You Billy! Damn you, Billy! You ——! ——! —— Billy! Dick! You Keno!"

The men whoop and yell and cheer and push and pull. All at once, the mules make a simultaneous effort and jerk the wagon up the grade on a run. Then the teamster licks his mules, just for luck; the wagon-master damns the teamster, the quartermaster damns the wagon-master and the pioneer party damn the quartermaster. But the team has surmounted its last difficulty before reaching camp for the night, and the voices of the mules are now upraised in a song of gladness. Much objection has been made to this chanting, as practised by mules, but the objection strikes me as frivolous and untenable. The mule's song may be just a particle monotonous and the nasal pitch he commonly employs, somewhat harsh for cultivated ears, but the question of pitch is a question of taste, and the mule's taste may be better than our own; or, if worse, this is the land of liberty, and the mule is free to enjoy himself as he pleases.

The charge of monotony is true, but it applies with equal force to the song of the lark, we all pretend to admire. We may admit the mule's lack of taste and skill in the rendition of his scanty repertoire, but we cannot deny him a full meed of praise for the earnestness with which he throws his whole soul into his work and pours forth his voice in song.

The pack-trains have frequently received my favorable notice in these pages. I can only add to what has already been said, that in winter as in summer and spring, our packers, under the able supervision of Tom Moore, attended with an assiduity almost devotion to the wants of the animals under their care. Some of them were droll fellows; all of them far above the average in intelligence, or above what their rough garb and unshaved faces would lead an observer to imagine. Seated by the camp-fire by night, I often listened to their conversation and never failed to be impressed with the clearness and accuracy of their judgment.

While on the Belle Fourche, one of them came up to see me. He was considerably under the influence of Black Hills whiskey brought in by parties from Deadwood. He began narrating his "up and downs," or more strictly speaking, his unchanging "downs" in the world. He had been a private soldier in the

4th Infantry before the War, at the period when Grant, Sheridan, Kautz, Stanley, Hood and Augur were captains and lieutenants in that regiment; "and now," he said, musingly, "they've every last one of them been made a gineral; 'n who 'm I? Nobody. I never was nobody. I never expect to be nobody. The highest I ever got to be in the world was a lance-corporal's bunkey."

Slowly we progressed southward to the line of the North Platte, the days becoming colder and colder, the nights more and more dismal: to keep one's head out from under the protection of buffalo robes meant frozen ears and nose; to keep it under threatened suffocation.

There was about the winter scenery of that part of Wyoming a bleak and barren dreariness, whose monotony at times appalled the traveller conscious of its magnitude.

Mile succeeded mile as the column advanced, but no change occurred in the perspective of snow-mantled hillocks, gashed with ravines and tufted on their summits with a scanty line of timber. The leaden pall of the cloudy sky was an effective setting for the cheerless landscape which, in spite of its gloom, had still a weird fascination over the sight which never tired of looking at it.

The winding courses of the streams were defined by the skeleton limbs of trees, whence every bird had flown. Even crows and such carrion eaters were seen only at intervals, but once or twice the honk-honking of wild geese, high in air, announced a migration of those birds to the South.

One of the most disagreeable days in my experience was Christmas, 1876. We were pushing across the Pumpkin Buttes, doing our best to get into bivouac and escape the fury of the elements, which seemed eager to devour us. Beards, moustaches, eye-lashes and eye-brows were frozen masses of ice. The keen air was filled with minute crystals, each cutting the tender skin like a razor, while feet and hands ached as if beaten with clubs. Horses and mules shivered while they stood in column, their flanks white with crystals of perspiration congealed on their bodies, and their nostrils bristling with icicles.

Two of our thermometers indicated 26° below zero, Fahrenheit; neither was of any service. Spirit glasses in Deadwood registered that day 40° below, and in Fort Sanders, Wyoming, 58° below zero, Fahrenheit, and we were in the direct line of the blast howling between those two points.

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Major George M. Randall joined us with seventy-six Crow Indians, all that remained of over two hundred, who had started out from the Agency in the Judith Basin, Montana. Their march had been one of phenomenal severity: crossing the Yellowstone at the mouth of Clark's Fork, up that and the Big Rosebud to their heads, thence to the Gray Bull and Stinking Water, on to the Big Horn River, across it and the Big Horn Mountains to the source of the Tongue—down that a few miles, and then south to Cantonment Reno, and thence on our trail until they overtook us, returning at Pumpkin Buttes. Most of the Crows became thoroughly disheartened and declined to face the fearful inclemency of the weather. Randall and his interpreter, Fox, endeavored without avail to persuade them to continue. The greater number returned to the Agency, spreading the report that Randall and their comrades had been frozen to death in a snow-storm in the Big Horn Mountains. This had almost been the case. In the worst of the storm Randall's people discovered that they were in the midst of a small herd of buffalo, and began shooting right and left. The warm carcases furnished protection to the nearly frozen feet and legs, which were thrust into them, and raw steaks devoured greedily by famished stomachs that had eaten nothing for more than two days.

When within less than fifty miles of Fetterman, we found waiting for us Louis Richaud, a half-breed Frenchman and more than two hundred scouts, from the Spotted Tail Agency. The change in the programme sent them back, slightly in advance of the expedition, their horses being in prime condition.

The impossibility of procuring anything like a sufficiency of forage for the cavalry, compelled the expedition to march to Fort Laramie and other points, to be put in good condition for the earliest days of spring. But the Spring campaign was not to be. There remained but one band of any size, in spirit to fight, on the American side of the British Line,—the band of "Crazy Horse," one of the foremost of the hostile Sioux chiefs. The Cheyennes were broken and humbled, and runners from them had arrived at Red Cloud Agency to say that they were coming in as fast as they could to surrender, and were so dissatisfied with the inhospitable reception granted them by "Crazy Horse" when they sought shelter in his camp after the fight of the 25th November that they would gladly go out to attack him with the American forces.

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The game was in our hands, and, after the weary marching and countermarching of two winter campaigns, and one during the summer which for severity was almost Hobson's choice,—after fighting the enemy on the lower Powder, Montana, in February and March; on the Tongue River, Wyoming, and on the Rosebud, Montana, in June; on Goose Creek, Wyoming, in July; at Slim Buttes, Dakota, in September, and on Willow Creek, in November, we had the gratification of receiving messengers begging the Government to stay its hand, and give all those on the war-path a chance to collect their wives and families and bring them to the Reservation.

"Spotted Tail," one of the shrewdest of the American aborigines, frankly admitted that further resistance on the part of the hostiles would be suicide and not warfare; twelve months previously, his sarcastic predictions of the dangers to befall the troops had proved him to be at least a sympathizer with those of his tribe arrayed against the Government.

But for reasons not necessary to recapitulate he was at this period most anxious to be individually the means of bringing in "Crazy Horse," and thus solidifying his position in the tribe and with the Government.

After submitting his proposition to General Crook, and having conferred fully with Colonel Julius W. Mason, 3rd Cavalry, commanding the troops on his Reservation, he started out to see "Crazy Horse," and had no difficulty in letting that stubborn red-skin understand that he must come in on the full run.

There would be the same, and possibly a larger force of white soldiery to fight when the snow melted, there was no help to be expected from the Reservations, which were under strict surveillance and, worst feature of all, was the certainty that more than one thousand Indian scouts, regularly enlisted or going along as free-lances, would obey the orders of the Government when the movement began.

So, first the Cheyennes, under "Dull Knife" and "Little Wolf," surrendered, making but one condition, that they be allowed to send their warriors with the white soldiers to fight "Crazy Horse; and lastly, "Crazy Horse" himself and his band.

The aggregate of men, women and children thus surrendering at "Red Cloud" and "Spotted Tail" agencies, was not quite four thousand five hundred, but of the ponies, which ran up into

the thousands, I failed to keep a complete record. "Crazy Horse's" people alone had more than two thousand.

My relations with these people, either in Peace or War, did not terminate here, but the expedition did and so must my story which, disconnected and hastily prepared as it is, will still, I hope, give my readers a good, general idea of the manner in which our expeditions were conducted against the savage tribes in the unknown region which has within the past winter supplied our national standard with the beautiful stars of the two Dakotas and Montana, and will soon, I trust, add still another for Wyoming.

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THE INSTRUCTION OF NON-COMMISSIONED OFFICERS IN THE ARMY.

By FIRST LIEUT. HARVEY C. CARBAUGH, U. S. A.,

Fifth Artillery.

WE have reached a point in our military establishment where the subject of the general education of our non-commissioned officers presents itself. By general education is meant the possession of knowledge outside of purely military subjects. Shall we attempt this general education? Is there any real necessity which urges it? If so, to what end?

It seems to the writer that the main object in view in the instruction of non-commissioned officers in subjects other than purely military ones is to make possible a more perfect military education, for as Boguslawsky says: "The education of a nation in general, and its military education in particular, are the sources of the tactical efficiency of an army."

Another object often suggested is, in order that the end of a period of enlistment may find the man better fitted, by his service in the Army, to fill a position in civil life. However, this seems secondary to the main purpose just suggested and can hardly be presented as a controlling element in selecting a course of instruction. Looking at the subject from a military standpoint, should we undertake the general education of our non-commissioned officers, and if so, in what way?

It would certainly be an injustice to say that, for military purposes, we do not possess in our present body of non-commissioned officers a very respectable and efficient lot of men, capable of understanding and profiting by special instruction. We must remember that, for military efficiency, intellectual ability is not the first requisite of a good non-commissioned officer; tact, common-sense, strength of character, thorough honesty and trustworthiness are essentials which can be made more valuable, but cannot be supplied by general education. As to the necessity for special instruction the following opinions recently expressed may be quoted:

The Secretary of War says: "Give the soldier an opportunity to so improve himself, that when he leaves the Service he may be better fitted for civil life than when he entered it. Post schools should be established, where not only instruction by lessons and lectures should be given in matters pertaining to military service, but also in the elementary branches of mathematics, science, mechanics, surveying, engineering, drawing, etc."

The Adjutant-General of the Army says: "It must be admitted that the rapid advance in the Art of War requires more study, closer application and greater capacity on the part of non-commissioned officers than in former years. * * * The first sergeant must have tact, sound judgment, superior intelligence, and have a thorough knowledge of all details, orders and papers pertaining to company administration."

The Inspector-General of the Army says: "We cannot recognize too clearly that modern warfare makes enlarged demands upon the abilities of non-commissioned officers, and their character, instruction and familiarity with responsibility is of very special importance to us, as from them we take a considerable number of our officers. A certain deterioration in the instruction and abilities of our non-commissioned officers is reported, a serious matter in any Service that attempts a perfect performance of military duty, and we cannot afford to admit or permit inferior quality in so important a particular." These views not only indicate that the general education of our non-commissioned officers ought to be advanced, but to a certain extent show the reasons for it and the subjects to be included. While the demand for intellectual improvement is found in the requirements of modern warfare, I fancy that practical reasons also lie in the necessity for the military establishment to keep pace with its contemporary civil institutions and in the future usefulness of the Army as a national training school in which to keep alive the military spirit of the people and to secure the intelligent development and advancement of military principles, without which civil liberty in its widest sense cannot be secure. If we consider the demands made upon a non-commissioned officer of artillery as to the use of surveying, meteorological and engineering instruments we must admit a necessity for intelligence and skill beyond that possessed by the best equipped recruit. Similar demands might be suggested in regard to the non-commissioned officers of the other branches of the Service. While the necessity for greater

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knowledge and skill must be conceded, yet the subject is one calling for conservatism all along the line, not only as to the extent such education should be pursued, but also as to the methods to be adopted. The non-commissioned officers, as a rule, are men of limited intellectual capacity. They are of mature years, and have passed the schoolboy period of close study, recitation and resulting mental development. The system to be pursued must aim at storing a mind already developed with necessary information, and in training the man by practical exercises, repeated, until he becomes, as it were, a skilled mechanic in the use of such information. How shall this necessary information be imparted to the man? Plainly, not by any attempt to assign lessons to be studied thereby hoping to increase the calibre of his mind by compelling him to overcome intellectual difficulties, but, by illustrations and actual demonstrations, made before him, of the things to be taught. Not by dry, abstruse, theoretical lectures on scientific subjects, but, by clear and practical applications of the facts he is to learn.

Having explained a fact and demonstrated its application, a well illustrated text-book should then be placed into the man's hands. Such a text will recall to his mind by pictures and reading matter the subjects already taught. Nothing should be theory, everything should be practice. The information thus obtained will be more easily remembered by reference to an illustrated text, which will keep in view as a definite whole the things taught. We all appreciate that, after a certain amount of instruction, the memory should be aided by suggestions through the eye. Such an aid or reference book would serve another purpose in being a guide, not only for the person instructed, but for the instructor, which would do a great deal to secure uniformity and definitiveness in the choice of subjects.

In suggesting the subjects to be taught, we are met at the outset by a difficulty which the Post school, aided by careful selections of future appointees, should be able to remove. I refer to the fact that many of our non-commissioned officers possess little or no skill in the ordinary and fundamental operations of arithmetic to include fractions. As almost any mechanic must be able to perform these operations, I venture to assume that very little trouble need be expected in removing this defect.

The subjects in which non-commissioned officers are to be instructed should include only practical and useful information. Its

application can then be practised until habit, in addition to thought, makes it ready for any particular purpose.

The arrangement of this information into a course of instruction calls for a systematic and logical order. It should be sufficiently in detail to suit the ability of the learner and to meet the necessities of the Service and yet allow latitude for individuality on the part of the Instructor.

General Orders No. 47, of 1889, issued from the headquarters of the Army, outlines in a comprehensive manner the subjects in which a non-commissioned officer of artillery should be instructed. The following outline is suggested as embracing the subjects for all non-commissioned officers in the Army.

OUTLINE.

1. The units of measurement, linear, surface and angular ; and their application in elementary field geometry.
2. Direct measurement of distances and surfaces.
3. The care, setting up, and use of angle measuring instruments.
4. The use of data obtained by means of angle measuring instruments, including the use of logarithms and the solution of plane triangles.
5. Indirect measurement of distances with and without special instruments.
6. Setting up meteorological instruments, care and reading of same, and use of the data thus obtained.
7. Electricity and its application—simple electrical tests and measurements.
8. The general and special properties of bodies,—the cause and effect of motion, and principles involved in pointing guns.
9. Power and machines, to include the use of the most important sources of power.
10. Engineering as used in field sketching and in the construction of temporary cover, roads and bridges.

In this outline all matters relating purely to tactics or the care and use of arms and other property connected with the different arms of the Service have been excluded, the intention being to present a course of instruction which will make men "handy and ready." It includes a wide range of subjects, yet they seem possible of being combined and presented in a simple and effective manner.

The inducements to be used in securing progress must also be considered. Comment upon this subject may seem heretical in a military organization when orders are all that ought to be necessary in securing the performance of any duty. This is true of matters of a purely physical nature, but when the action of the mind is to be called into play exact performance cannot be secured by command alone. The failure will not always be due to lack of ability on the part of the learner. With us no cast-

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iron rule of reduction in rank, discharge or other punishment upon failure can be profitably followed, therefore proper inducements should form a part of the system.

Intellectual activity must be awakened by attractive means and the process of storing up information rendered interesting. True, there is no royal road to be followed in the abstract, but relatively there is. A competent and interested instructor will develop interest, even enthusiasm, in very dull sensibilities and make plain and simple what under ordinary circumstances would be incomprehensible. Lessons, therefore, should never be assigned for future study and recitation, but should be illustrated, practised and then studied. Non-commissioned officers are not adverse to obtaining information, though they may be extremely adverse to mental efforts in the seclusion of a study room.

The increased importance of those who have obtained a required degree of proficiency may be regarded as an effective inducement. At present we hold out a commission as an inducement for becoming a meritorious non-commissioned officer. This is something of a delusion, if not a snare, and is liable to be used by persons of limited education as a short and easy road by which to secure a commission.

The inducement of a commission is, therefore, of but little avail to elevate the general tone of non-commissioned officers. We may quote Major Sanger's remarks on this subject as being to the point: "I do not observe any noticeable differences in the character of the enlisted men, who appear to maintain about the same standard. The very simple test for promotion from the ranks to the grade of second lieutenant has no doubt been the means of inducing many young men of the better class to enlist with the hope of obtaining a commission; but whether this has resulted beneficially to the Army is problematical. Until the educational standard of candidates for promotion is raised to the ordinary requirements of our country high schools, no ultimate good to the Service should be expected from such promotions, for however well a non-commissioned officer may do as a second lieutenant, he is almost certain to fail in the higher grades, unless his educational requirements are far above those now considered necessary."

To this may be added that the educational standard should include proficiency in those subjects of which a knowledge will directly increase the efficiency of a non-commissioned officer.

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The increased importance to be held out as an inducement to mental improvement should be certain and depend only upon the candidates reaching the standard. The Major-General commanding the Army states the case as follows: "The efficiency of the Army and the welfare and contentment of the enlisted men depend largely upon the non-commissioned officers. Hence it is very important that the character and dignity of the latter be elevated as much as possible. The vacancies available for the promotion of enlisted men to the grade of second lieutenant are necessarily very few in number, and the most meritorious non-commissioned officers are too old to commence a career as commissioned officers. Hence each non-commissioned grade should be made a real reward for meritorious service." This recommendation, aside from striking the key-note, comes with an authority which is indisputable.

There is another thought that might be added, inasmuch as increased importance carries with it increased pay, that only such non-commissioned officers as possess a certificate of having reached the educational standard shall be entitled to increased pay.

The first step in the higher education of our non-commissioned officers seems to be in securing an increase in their general education. This is the foundation which is essential for securing discipline and moral ascendency over the men and the consequent development of a military system to meet the requirement of the age, and without which their professional instruction cannot be carried to the required degree of perfection.

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A TRIP TO INDIA, CHINA AND JAPAN.

By CAPTAIN S. M. MILLS, U. S. A.,

Fifth Artillery.

(*Continued from* Journal No. 42.)

THE manner of disposing of the dead in India is a feature of the country to which one is forced to have his attention called, and although rather a gruesome subject, if you will permit, I will mention some of the methods and ceremonies followed, as you do not often find them described.

The Mussulman or Mohammedans bury their dead, and although attended with peculiar ceremonies, they are not so striking as that followed by some other sects or people.

The Hindoos cremate or burn the bodies of the dead to ashes. Death has no terrors for them, since it is only a change of existence. Alongside of the most fashionable drive, "Queen's Road" to Malabar Hill, is situated the Hindoo cremation ground.

When a Hindoo dies, information is sent to the friends and relatives of the deceased. These assemble forthwith and some of them go to the bazaars to buy the necessary articles for the ceremony. They procure two strong bamboos for the bier, chips of bamboo, a piece of white shirting, an earthen pot, copper pots, pieces of sandal wood, clarified butter, rice, and if the weather be wet some rosin and oil to replenish the flames. When the men return from the bazaar they make a bier, over which, when ready, some leaves and sacred grass, called "durbhas," are spread. The ceremony ought to be performed by the son of the deceased. Happy is the Hindoo who, when dying, has a son to perform these rites. In his absence it is performed by the brother, father or other member of the family. Whoever performs it must bathe, then shave off his mustache, and bathe again. All the while sacred hymns from the Vedas are recited by the officiating priest. In fact, every part of the ceremony is attended with the recital of sacred hymns. Sacred fire is kindled in the earthen pot, after which the body is taken out of the

house by the friends and near relatives. It is well washed, a piece of cloth is passed around the waist, and the body is then placed upon the bier and covered by a cloth, but the face is left exposed. The bier is then borne away by the friends, the chief mourner, who is to light the funeral pile, walks before the procession with the earthen pot in his hands. All the mourners must be bareheaded.

When the procession arrives at the burning ground, the bier is placed on the ground, and they commence to erect the pile. Four holes are made and strong posts about five feet high are fixed in them. Between these posts the pile is erected. When half the pile is finished the body is removed from the bier and placed over the pile, whereupon some of the relatives and friends place sandal-wood over the body. Prayers are repeated, and the remaining fuel is heaped over the body to complete the pile.

Then the son or chief mourner walks around the pile three times and sets fire to it. In about fifteen minutes it is a huge flame, and in about two and a half or three hours the entire body is reduced to ashes. Then the fire is quenched, all the mourners being required to drop some water on the spot in the name of the deceased, after which the whole procession repair to the sea or to a tank to bathe. Thence they proceed to the residence of the deceased, see the lamp which was lighted on the spot where the dead body was kept and then depart to their homes.

Before returning from the cremation grounds, alms are distributed to the poor according to the means of the family.

This is the more ceremonious form; the poorer classes accomplish the same but without the same formality, buying the wood and other materials, and hiring the services, at the gate to the grounds, where an active business is maintained at all times. Near the entrance, processions rapidly succeed each other, giving way in the streets for the passage of carriages. Frequently you will meet parents bearing the forms of little children without much ceremony and no procession, to the same destination.

Permission has to be obtained to go inside these inclosures.

The Parsees, next to the Hindoos, hold the most important position on the Island of Bombay.

At the present day they form a class of rich and active men, full of devotion to the English rule, and to whom the present prosperity of the island is in a great degree owing.

English is now of habitual use with them. Their wives and

children speak it, and it will probably one day be their national language.

But this brief account is to arrive at the point of telling how the Parsees dispose of their dead.

On the northeast coast of Malabar Hill are situated the famous "Towers of Silence." From the Gowalia Tank Road towards the north a winding avenue leads to the gateway at the top, on which is an inscription that none but Parsees may enter there. Permission had long before been secured for our admission, and our hotel-keeper, quite a prominent Parsee, acted as our guide.

After passing the portals we found ourselves in a small court-yard, from which you could only advance by mounting half a dozen steps. On the right is the "Suggree," a low stone building open on all sides, in which prayers are offered for the dead.

The object of having the court-yard lower than the level on which the Suggree stands is to prevent the ceremonies from being profaned by the gaze of unbelieving eyes.

When the mourners are numerous they group themselves around the building, and as it is open they can see all that goes on within and take part in the prayers.

The dead are never taken into the Suggree. Passing this building we enter a beautiful garden ablaze with flowers; along the walks are iron garden seats of European design and make. Beyond the garden on the undulating summit of the hill looking towards Malabar Point is the parklike, grass-covered tract in which at irregular intervals are the "Towers of Silence" where the dead are laid. The Towers, of which there are six, are round and about thirty or forty feet high and about fifteen feet in diameter. They are solidly built of stone, the walls being some three feet thick, and they are all colored white.

There is no window and only one door, which covers a small aperture about a third of the way up. To this aperture access is obtained by a narrow stone causeway, up which the bier-bearers with the dead alone may venture.

So sacred are the Towers that no one except the bearers, who are set apart for the purpose, may approach within thirty paces of them. Inside, on the rock pavement, spaces are marked out on which the dead are placed to await the vultures, and pathways are marked out for the bearers to walk upon without defiling the place where their unconscious burdens are to rest. "When a Parsee dies his soul goes to heaven, or elsewhere, according as he has

spent a holy or wicked life; but his body must not be tainted by corruption. It is therefore forthwith washed and purified, and if there yet be time, it is at once carried to the Towers before sunset. If not, it is kept until the early morning. Having been rendered undefiled, it is clothed in white and prayers are offered at the house by the family and friends. None may henceforth touch it; it is pure and must remain so. The women of the family take a last look, and the light bier, on which it has been placed, being covered with a white shroud, it is carried by the bearers to the hill. No vehicle can on any account be used; no one must even follow in a vehicle; the whole journey, no matter what the distance, must be made on foot. All who form part of the cortege must have been washed and purified and clothed in white, and to touch any one would be to become defiled. The women sometimes wear mourning, black; but the men do not wear mourning. No woman attends a funeral; the female relatives always remain at home that day, but they may and do go to the Towers afterwards to pray.

"Following the bier-bearers in procession, those forming the cortege wind their way slowly, holding scarfs passed from one to the other, to the foot of the steps leading to Malabar Hill. Ascending these and after reaching the crest, the priests go through the sacred ceremonies in the Suggree. When the prayers are over the body is borne to the causeway leading to the door of one of the Towers. Here the face is uncovered that all may take a last look; it is covered again, and the form disappears into the Tower. Outside of the lofty wall which surrounds the space occupied by the Towers are hundreds of acres of land, partially cultivated, which the Parsees own, and which they have carefully kept as a sort of neutral territory between the domain of outsiders and that of the Towers, so that it is entirely secluded from sight. Some hundreds of vultures make their abode in the lofty palms within the inclosure, and when the body is deposited they swoop down and do not rise again until all the flesh has disappeared.

"In a few hours nothing of the body remains but the bones. When all is over the vultures come to the top of the Towers and remain there for hours without moving, then they take their heavy flight to the palms around; seldom do they go beyond the trees in the rough ground outside the vast compound."

There is nothing of a sacred character ascribed to these ob-

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scene but useful birds. They are regarded simply as a means of preventing decomposition, and in accomplishing that task they perfectly succeed. In consequence the grounds about the Towers have nothing of the hideous taint of the charnel house. There is nothing obnoxious to health, and not the faintest disagreeable odor to mingle with the perfume of the roses blooming around.

Turning from these sombre details the most magnificent view of the island bursts upon you as you stand upon the Suggree steps and look across the bay beyond. The white walls of innumerable bungalows and public buildings gleam upwards through a forest of palm trees. Beyond rise majestic elephanta and other mountain islands; while high over all is the clear sky, which permits all to be seen as through a glass of power.

During this period of sight-seeing and social festivities, we were providing ourselves with the necessary outfit to take with us to the northern part of India, where we were to join the army in the field.

The thermometer at this time, last days of December, ranged from 85° to 92° Fahrenheit, which made the lightest of summer clothing indispensable. As we traveled north, and during the middle of the day while in the the field, the weather was generally cool and pleasant. In the evenings and mornings campfires were quite necessary.

Large India helmets for ordinary wear, with a "puggree" wound around the base of the crown, was the first essential purchase advised. For the field, and when under arms, our white helmets (we had taken ours with us) made us, the American representatives, quite in uniform with the English; in fact our helmet is copied almost directly from the English. They, however, wear the spike and chain, the latter under the chin, and in these particulars only were we different from them.

We were the only representatives, except the Russians, who wear a cap with a linen cover and a Havelock cape in the field, that were provided with a uniform head-gear for a warm climate. Many, if not all of the others, purchased the English white helmet, upon which some of them placed their own mountings, and with the Germans this made the helmet very heavy; others wore them without ornament.

Our last night in Bombay was passed most pleasantly at a dinner given by Lord Reay, the Governor of the Bombay Presidency, previously referred to, after which we attended a ball given

in our honor at the Bombay Yacht Club. From this ball we went direct to the railway station to take our special train for Delhi.

We left Bombay at 2 A. M., January 1st, by special train of ten cars for Delhi, via Baroda, Surât, Ajmer and Jeypore. Each car was divided into two compartments, each for the accommodation of four persons; on this occasion but two persons occupied each compartment, the representatives of each country having a compartment to themselves. There was a door communicating between the compartments, the Russian representatives occupying the compartment adjoining ours throughout our railroad journeys in India. The compartments were conveniently arranged, with numerous racks and shelves, sufficient for all small parcels, and a small toilet room at the end of each. Four cushioned seats upon which the lower beds were made parallel to the car, the upper bed being suspended to the side of the car during the day. The cars are well ventilated, and during hot weather the slat-work on the sides near the junction with the top of the car is covered with matting, which is kept wet and by evaporation keeps the inside of the car cool. Several important places are passed on the road, Surât-Broach, a place of much commercial importance and principal point for cotton export. There is a very fine railroad bridge, 25 spans of 180 feet spans, that here crosses the Nerbudda, a river regarded by the Hindoos as the most sacred, the mere sight of which imparts purity, and its sanctity lasts forever; Baroda and Ahmedabâd, the latter an important place of 130,000 inhabitants and the headquarters of the northern division of the Bombay Army.

At Ajmer we left the train for a few hours, and took breakfast at an English club, by which an invitation had been extended to us while *en route*.

Ajmer is one of the principal towns in Râjpootâna, one of the native states or districts in India. It is a very striking city of great antiquity and celebrity. It is situated on the slopes of a valley surrounded by rocky hills, and the town is surrounded by a stone wall with five lofty gateways. We drove after breakfast to Lake Aunâ Sagar, a short distance from the city. The lake is fringed by the Native Government courts and other buildings which are occupied in the warm weather.

We enjoyed the rest here after the railway journey. Jeypore, our next stopping place, is one of the interesting places in India.

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This city is entirely under the government of a native prince with an English Resident. The prince is considered a most enlightened man, as he has gas lamps in his streets, which is pointed out to you as an evidence of high European civilization.

We visited the School of Arts and Industry, in which the Mâhârajah takes a great interest. We saw the collection of articles that were to be sent to the Colonial Exhibition in London, also the special work in which Jeypore excels, viz., enameled jewelry, which was very beautiful but expensive, also the carved figures in soap stone; visited the mint and zoological gardens, and a private collection of tigers, many of them being distinguished man-eaters; they were confined in cages at the foot of a public street, in the midst of half naked children running about in reach of the beasts. The cages were apparently of such temporary construction that at every plunge of the beasts against them you thought they would surely give way.

We visited the palace, but on account of indisposition did not have an audience with the prince. The palace seems to embrace one-third of the city within its walls—beggars, soldiers, politicians, priests, and all manner of human beings who live on the royal bounty.

We climbed to the highest top of the palace, from which you obtain a beautiful view of the surrounding country, and the gardens of the palace, said to be the most beautiful in India. We saw no signs of the household; information is generally conveyed of the approach of Europeans, upon which the ladies pass into seclusion.

The prince has a dozen wives, I believe, and it is the boast that no Râjput princess has ever been gazed upon by profane European eyes.

The Mâhârajah has many distinguished titles, among others Ram Singh, by which he is commonly known. He is also Knight Commander of the most exalted Order of the Star of India. He is entitled to and receives when visiting any province, English or native, a salute of twenty-one guns, the highest salute given to any Indian prince.

In the way of good blood and long descent, this prince traces his line back more than one thousand years, and then rises into the heavens and claims the universe among his progenitors. This is from the fact that his line claims descent from the great mythological character Rámáyana.

This prince is very friendly to the English rule, and is a member of the Legislative Council of the Viceroy.

His state embraces about 15,000 square miles, population about 2,000,000, and a revenue about $2,225,000. About $200,000 is spent on public works yearly.

We visited the private stables, saw a number of handsome Arabian horses, and on the riding ground several of them performed various tricks with their trainers for our amusement.

The ancient city of Amber is some few miles distant from Jeypore. The former residence of the Mâhârajah is located there. It is a place of great antiquity and beauty, but we did not have time to visit it. After completing such of the sight-seeing as I have mentioned, we were driven to our hotel accompanied by our escort of native troopers, by whom we were received at the station on our arrival in the morning. Here we found the merchants from the bazaars sitting on their haunches on the green, in front, and by the roadside, waiting our return to display their various articles of armor, knives, jewelry, silver, etc., etc.

If there is one thing an Indian can do with patience, it is to wait; information of the arrival of a European in any town, soon spreads among the bazaars, and your hotel and the grounds about swarm with them as long as you remain, hoping to catch an encouraging glance from your eye, and an opportunity to display their wares. Those who have had experience in making purchases in certain parts of Europe or in Constantinople, will readily understand that there is no such thing as a fixed price for any article, and that unless the article is secured at less than one-half of the original price asked for it, though of course the family will be impoverished, the children have nothing to wear, etc., you are probably badly cheated.

We arrived at Delhi on the morning of January 3d, and were met at the station by the other officers, mentioned before, who were detailed to accompany us, and with a small escort of the 17th Lancers, drove to the camp of His Excellency Sir Frederick Roberts, Commander-in-chief. The camp was located some two miles north of Delhi, and just beyond the historic "Ridge."

This escort of the 17th Lancers were the first English troopers we had seen in India, and I was instantly attracted by their soldierly bearing and horsemanship, which they had an opportunity of showing, owing to the noise and confusion upon the arrival of the train at the station, and the screeching of the engine whistles.

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There were but few of them, all were young men, bright faces, cleanly shaved, good figures, tight fitting jackets, and sat their horses while at rest and when at the trot as though part of the animal, but without rigidity; I recognized at once the instruction that these men had received as identical with our own. Later, when I came to know the 17th Lancers, which by the way is one of the "swagger" regiments of the English Service, and by whom we were most hospitably entertained upon our visit at a later period to their station at Lucknow, I found that the riding master of the regiment, who has the rank of captain, was perfectly familiar with our tactics and method of instruction, and had adopted many features of it in his instruction. This officer had frequently been in the United States while serving in Canada. Let me state here that the English troopers that I have seen more or less of, viz., the Lancers, Hussars and Dragoon Guards, do not rise in their stirrups, bending the body, wriggling backward and forward with the motion of the horse, as you see in Rotten Row, and perhaps with some of the Guard regiments about London; a contrary opinion I know prevails. Upon arrival in camp, each representative was assigned a large, commodious tent, one tent as it were pitched over the others, with air spaces four or five feet between the sides and tops; aside from this, these side passages were very convenient for servants to pass in and through the tent without going through the centre. The interior of the tent was further divided by canvas curtains into sleeping and dressing apartments, etc. Our tents adjoined the headquarters staff, but grouped together and designated, "Foreign Officers Camp." In front of each tent was a small flag of the country that each represented, and the name of the occupant painted in distinct letters upon a board about two feet long, suspended at the side of the entrance to the tent.

Each tent was supplied with all necessary comforts and conveniences, beds, bedding, a coarse carpet on the ground, printed rules and regulations of the camp, with diagram and directory of the same, hours of arrival and departure of mails, postal rules, maps, plans and all information of the future operation of the two armies. In each tent was a chimney and fire-place, for in the mornings and evenings a fire was necessary in this latitude and at this season of the year. We also had in our camp, centrally located, a large reception tent, which was comfortably furnished; soft rugs under feet, the walls and top sides hung with "phool

karries" (silk and worsted embroideries) and cashmere embroideries in silver, upholstered sofas and chairs, writing tables, latest newspapers from all parts of India and London, piano, etc. Adjoining this tent and connected with it by covered passage way was the mess tent, in which forty persons or more could be seated with comfort.

The afternoon of our arrival we officially called upon General Sir Frederick Roberts, and were received by him in his headquarters tent, with his entire staff, British and native, all in full uniform.

That evening we dined with the Commander-in-chief, and with some forty or more officers, several ladies and prominent civilians. There were a number of ladies and gentlemen in Sir Frederick's camp as his guests.

A reception followed the dinner, at which we met many of the prominent officers of the Southern Army, which army had reached the day before a point some three miles north of the camp, in their march from Guargaon, some twenty miles south of Delhi, where the brigade, divisional and inter-divisional manœuvres had been taking place the previous two or three weeks. The foreign representatives were invited only to witness the manœuvres under the 4th period, which was that of the "two armies manœuvring one against the other." These armies were separated at the beginning of the manœuvres by a distance of 125 miles. The line of concentration of the northern force being north of the line Umballa and Pathiala, that of the southern force being south of the line Gooegaon and Farcedabad.

The next day we spent in selecting horses and making other arrangements for taking the field, repacking baggage and selecting only such necessary clothing as would be required for the field, and of it we were only to take *field* allowance. The 9th Lancers had been dismounted and returned to England a short time before our arrival, and the horses of one troop of this regiment had been reserved for our use. They were "Walers" and, generally speaking, well trained to the bridle and in other respects for active service, being good jumpers, active, nimble and full of life. We each had two horses, with two "syces," or grooms, who followed unweary all day with a blanket over his arm, and whenever we would dismount for luncheon or other purpose there would appear this "syce" to hold and cover the horse. It was a mystery to me how they could follow and

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keep track of us in the midst of twenty to forty thousand troops.

I was fortunate in selecting two good horses, and afterwards had reason to congratulate myself that I had availed myself of the permission to select our mounts, which all the representatives did not do, and I expect had reason to regret it afterwards, as several were badly knocked up by the severe riding at times, which was generally ascribed to the bad gaits of the horses. I anticipated what was coming and knew that we would have to follow officers unused to the field and accustomed to cross country riding. I was the junior in rank of all the foreign representatives, though not the junior in age, so it was a matter of pride with me that I should at least keep up, and be found with the rest of the staff at the close of the day's operation.

The following incident, though strictly belonging to a paper that will follow this, I will mention here, confirming a judgment I had formed some years ago while instructor in tactics at the Military Academy, against the present method in use in our Service for supporting or carrying the sabre from the waist when mounted and during rapid gaits. I wore while in India a light artillery sabre. Yes! I know I am not a mounted officer, but I had permission; I foresaw in what a sorry plight I would find myself among the representatives of the armies of Europe, and though an *Artillery* officer not allowed by regulation to wear spurs, top boots or a mounted officer's sword; I explained this to the Adjutant-General and obtained authority during this special service to wear mounted equipments. Upon going into the field I was careful to secure my sabre to the scabbard, knowing by experience that it was quite liable to jump out during rapid gaits. It was during a rapid gallop the second day out, the weight of the sabre tugging at my waist at every bound of the horse, and when not swinging in the air nearly at the height of my head, was beating the sides and flanks of the animal that the miserable metal snappers, by which the rings of the scabbard are attached to the straps of the belt, gave way or opened, and away went my sabre, much to my mortification. I never found it, though I returned after going some little distance, to as near the spot as I could determine.

Fortunately one of the Russian officers was able to furnish me with an extra sword he had, which answered all purposes while in the field. Sir Frederick Roberts, who had learned of

my mishap, had most considerately sent to Calcutta for a sabre, which he presented to me on our return to the permanent camp at Delhi, thus giving me another evidence of the many we had received of the thoughtful attention and kind-hearted character of that distinguished gentleman and soldier.

The sword or sabre, when mounted, should be carried either in a frog attached to a strap passing over the shoulder and under a belt at the waist; this supports the weight of the sabre from the shoulder and keeps it reasonably close to the side, or else the sabre should be entirely detached from the person and suspended in a frog attached to the skirt of the saddle, or front part of the saddle.

The weight of the sabre with the scabbard is very considerable to be borne at the waist when moving faster than a walk. If the sabre is drawn, of course, the weight is not so material, but the sabre is not ordinarily drawn except in actual engagement or on occasions of ceremony.

To continue. We were supplied with maps of the country, and with the organization and strength of each army, and with the problem and general scheme of operations upon which the two armies would manœuvre.

We left camp early in the morning of the 5th of January; the first ten or twelve miles or until luncheon, was made in open carriages. After luncheon we took "tongas," the two-wheeled, low, heavy covered native or country wagons, drawn by two horses, the tongue supported by a curved cross-bar resting upon the back of the horses, similar to a Roman chariot, and over rough roads it is a beastly, uncomfortable thing to ride in. It is universally used on the great highways for making journeys over India; of course, no one travels in that manner but officials. The driver uses a copper bugle which announces the approach to villages and tedious trains to make way for it to pass. That evening we overtook the army moving northward, and remained either with the Southern or Northern Army for the next two weeks, depending entirely and living in our flying camp. Each representative in the field was provided with a tent about the size of our wall tent, a small canvas camp bed, a common rug for the ground, two blankets, a pillow, small folding table, rubber bath-tub, etc., and one body servant.

The full mess equipment accompanied us in the field, and every night we had a large dinner party; the prominent officers,

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with a certain number of their staffs, of the army with which we happened to be camping for the night being invited, and in this wise we met nearly every officer of prominence in the two army corps of forty thousand men.

Our table was supplied entirely with such food as only could be got from Europe, and as this had to come from Bombay, I can conceive that the daily marketing was no easy matter. There was daily communication for mail, etc., kept up between our flying and permanent camps.

These dinners were entirely informal; all were in undress uniform, and in the best of spirits, no speeches, the terror of those who cannot make one, awaiting you at the end of the dinner, rarely any discussion, never any criticism of the days' operation, and the one incident which always impressed me, and for which for the nonce quieted everything, and that was the toast, which is always drunk, and which I described in a previous paper. In the midst of the clatter, laughter and noise, and upon intimation, all would rise with glasses in hand, perfect quietness prevailing, then as one voice—"To the Queen, God bless her," and the glasses would be emptied, all would remain standing a few seconds, while the band played the first bar of the national anthem, seats would be resumed, conversation taken up and cigars and coffee brought in. I could occupy much time, if I dared, to begin to name the many prominent officers we met on these occasions, many of whom are identified with the history and development of India, and bearing the names of those who in other times were conspicuous and distinguished. It is a striking fact, that you find the descendants of many of those who were prominent in former periods, now in the military or civil service of the Government, and to which they are mostly devotedly attached. Not to mention many, the following are a few names that occur to me—Lawrence, Gough, Chamberlain, Dillon, MacGregor; General Sir Charles MacGregor, was a conspicuous figure among these, a man of almost colossal figure, genial countenance, commanding presence, and endowed with much ability, I never met him but I thought of the lines of Macdonald—"Where MacGregor sits there's the head of the table." General MacGregor was at this time commanding an infantry division of the Southern Army, and only a short time before had been Quartermaster-General of India. Do you realize what I say? A few months before he had charge of the important staff and supply department of the Army, and now

was commanding a *division in the field.* Similarly, the present Adjutant-General of the Army in India, Sir Thomas Baker, enjoying the local rank and pay of a major-general, was but a few months before in command of a brigade. These staff positions, and the command of troops are held for five years. This is a prominent feature of the Military Service in India, the lessons of which I think are most applicable to our small Army. I reserve a fuller explanation of the working of this system and similar professional topics for another paper. All branches of the Service were represented on these occasions. Except among the higher grades, my own branch of the Service was not so often met, these though I would personally seek, and I have the liveliest recollection of their cordial hospitality, as we sat around their own camp fires in the evening and discussed the business of "gunners," as the artillery is called in the English Service, and with me this was admissible, as I was not considered a foreigner in the sense that other representatives might have been. As a body they are a thoroughly trained, high spirited class of men, and of all the batteries represented in the two army corps, I don't believe there was an officer in command of a battery over 43 years of age.

There was intense enthusiasm in this branch of the Service, which was thoroughly aroused on this occasion, for Sir Frederick Roberts himself was a "gunner."

The engineer officers I remember also as agreeable and accomplished men, and notwithstanding the prodigious labors they are called upon to perform in the various civil works of the Government, they are very ambitious and proud to command troops in the field, and just at that time were enjoying the gratification of the successful conquest of Burma by a force under the command of General Mackenzie, an *Engineer* officer. These officers were familiar with the accomplishment of many civil-engineering problems in our country, notably Hell Gate, and were familiar with the names of Newton and "Eads."

The medical officers were unstinted in their praise of our surgeon-general's office, in the production of the Surgical History of the Rebellion; and all officers recognized and appreciated the dash and enduring qualities of our cavalry and infantry in their Indian campaigns, and claimed that there was a bond of sympathy between the two Services in the character of the barbarous enemies that each had to contend with.

And now under the division of the subject as I have arranged,

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we will leave the Army here and take up the narrative after our return to the permanent camp at Delhi about the middle of January.

Lord Dufferin, accompanied by his daughter, Lady Blackwood, and the military members of his staff, arrived in camp from Calcutta the evening after our return, to be present at the grand review of the two army corps which was to take place in a few days.

In the afternoon following we paid our respects in full uniform, to His Excellency, who received us alphabetically by the nations we represented, the informal welcome lasting some fifteen or twenty minutes for each party, no one one else being present except the Commander-in-chief, Sir Frederick Roberts, and one aide-de-camp.

During Lord Dufferin's service as Governor-General of Canada he had frequently been in the United States, and had been the recipient of many kind attentions from our people, to which he pleasantly referred on several occasions.

His charming, affable and most pleasing manners made a most favorable impression upon all the representatives, and in a characteristic speech delivered the following day, showed that there is perhaps no statesman of modern times who has had a more extended experience in foreign countries, or is more fitted to receive representatives of the different nations of the world. His familiarity with the customs and pleasant associations connected with each one's country made all feel entirely at ease in his presence.

At a formal breakfast the following morning in the foreign officers' camp, at which Sir Frederick and many prominent officers and civilians were present, the Viceroy made the following remarks welcoming the foreign representatives to India. At that time the Viceroy thought he would be unable to receive in person the foreign officers at Calcutta, the seat of government, on account of his proposed trip to Burma. This trip was, however, deferred a few days so that he might do us the honor of a ball, and on another evening a formal dinner, both of which will be referred to in its proper place in this narrative.

The following were his Lordship's remarks:

Ladies and Gentlemen: As this I fear is the only opportunity I shall have of doing so, I hope I may venture in the name of the Government of India to express how highly we consider

ourselves honored by the presence of these European officers who have come from so great a distance to witness the military manœuvres in which so considerable a portion of Her Majesty's forces in India, both British and native, have lately been engaged.

On behalf of my colleagues, and as the representative of the Queen-Empress in this country, I now bid them most heartily welcome.

All are distinguished representatives of the respective armies to which they severally belong, and I have no doubt we shall derive very great profit from such observation and criticisms as may have occurred to them. But not only do I desire to welcome them as the head of the Indian Government, I also wish to express my great personal satisfaction at receiving them in our midst. It so happens that there is not one amongst them to whom had he come as an ordinary traveller I should not have felt bound to show special courtesy and attention.

For instance, there is Prince Esterhazy, from whose grandfather at an early period of life I experienced great personal kindness, and who has received his mission here at the hands of Count Kalnoky, the Austrian minister of foreign affairs, who was an intimate friend and colleague of my own at St. Petersburg. In company with Count Kalnoky, I was permitted to be a spectator of Russia's annual great manœuvres, when I had ample opportunity of appreciating the splendid and gallant appearance and of noting the men and officers of the Imperial Russian Army, as well as of receiving most considerable kindness at the hands of His Majesty the Emperor. Not only so, but one of the Russian officers present wears the uniform of the regiment, who were good enough, when we left St. Petersburg to depute some of their number to say farewell to Lady Dufferin at the station, when they almost smothered her with bouquets.

Again, I see opposite to me two officers representing the most venerable and one of the mightiest of European monarchs; through accidental circumstances during a period of thirty years I have experienced from time to time at the hands of the Emperor of Germany repeated marks of his never-failing urbanity and goodness of heart, and I hope that when the representatives of the German Army return to their native land they will lay my respectful homage at the feet of their sovereign and assure His Majesty of the unspeakable pleasure it has given me to show them whatever attention lay in my power.

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On my left I am honored by the presence of the representatives of the French Army. One of them is well known to be more respected and universally liked in London than any one who has occupied a similar position. His colleague is an old acquaintance and both represent a country with most of whose distinguished statesmen and generals I have had the good fortune to be upon terms of intimacy. We have also many friends in common. To extend to these two officers my most respectful greetings is naturally, therefore, a labor of love. With the officers who came from Italy I can boast no personal acquaintance, and yet probably I am united in sympathy by far stronger ties than they themselves suspect—though an Englishman, or rather an Irishman, by profession, by birth I am Italian, and I never hear their beautiful language spoken without its recalling many agreeable memories. They can, therefore, well understand how pleasant it has been to me to welcome them to India.

Again, on the other side are two other officers whose presence here is as grateful to my feelings as that of any of their colleagues, inasmuch as they represent the Army of the United States, a country which I had often an occasion to visit when Governor-General of Canada, and whose border I never passed without experiencing at the hands of its inhabitants such an amount of kindness and hospitality as it would be impossible for me to forget. If, therefore, I have ever found myself in the midst of any company whose presence I should welcome it is that of these distinguished officers now present at the table. At the same time there is one consideration which perhaps mars the harmony of my greetings, as the followers of the profession of arms, it is the duty of our military visitors to bring to the utmost efficiency those means of mutual destruction to which nations are forced to appeal in the last resort. Now it has been my duty, as a diplomatist for several years, to apply whatever faculties I am possessed of to rendering those armies whose organization they are so eager to bring to perfection, as inoperative as possible.

Wars are the reproach and disgrace of diplomatists, whose ambition should be the reverse of that of our military friends, namely, to render War a lost and forgotten art.

Unfortunately, hitherto the soldiers have too often got the better of us, but whatever my professional instincts might have been as an ambassador, I am free to confess that as Governor-General of this country my desire for the maintenance of peace has been

still further intensified, and most heartily do I pray that the wisdom of all our governments and the calmness and moderation of public opinion in the various countries of the world may confine the efforts of all nations to such mimic warfare as that which you gentlemen have lately witnessed on the plains of India, and that in Asia, as in Europe, the beneficent triumphs of civilization may never be marred or interrupted by the terrible necessities of War. In conclusion, I have only to express my regret that my proximate voyage to Burma will prevent me from entertaining our foreign visitors in Calcutta as I should desire. If they will permit, however, I will commission my daughter to welcome them to Government House in Lady Dufferin's name and my own and give a ball to their honor, in order that they may have an opportunity of convincing themselves how favorable is our climate to feminine beauty; that our ladies' eyes are more fatal than our artillery, their wit more pointed than our bayonets, and that they are ready to give them as kind, though perhaps a more dangerous welcome to the capital of India, as that which we have endeavored to extend to them in our camp at Delhi. And now, ladies and gentlemen, I beg to propose the health of the emperors, kings and chiefs of states of the countries whose officers have done us the honor of visiting India.

The day following the foreign officers, with prominent officers from both armies—the Northern and Southern armies were united near Delhi—were invited by Sir Frederick to witness some experiments then being carried on with an armed train of cars. I see the results of these experiments are now published in a recent number of the *Proceedings Royal Artillery Institution.* I find among my notes, though, that the train was not complete at this time, being armed with only a 40-pounder Armstrong, old pattern, and two Nordenfeldts. The train was run out of the city a few miles, and the 40-pounder discharged a few times at a target located in the Jumna River. The successful working of armed trains in Egypt, during a previous campaign there, had probably suggested the idea of their adoption in India, particularly for transporting troops. I will not weary you with detailed notes upon this, as the experiments had not been completed and no conclusion arrived at. Personally I was not impressed with the necessity of providing an armed train for such heavy guns as the 40-pounders, and for field and machine guns we had developed the idea quite freely during the Rebellion.

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In the afternoon we made formal calls upon the Mâhârajahs of Bhutpore and Gwalior; the latter had accompanied the Southern Army in the field, in which army he had a small contingent, he was always visible in a separate part of the field during the exciting contests, with his elephants, retinue of servants and small body-guard, and frequently camped near us. It was said he was quite a soldier and took much interest in the manœuvres. We were received with much ceremony by him, his ministers standing on one side of the tent, muttering welcomes accompanied by profuse salaams as we entered. After being presented in turn we took seats, the Rajah's officials sitting opposite, picturesquely attired in colored silks, and some of them literally glistening with precious stones.

The usual dead silence reigned, Colonel Upperton being the only one near enough or who could talk with the Mâhârajah, of course, they knew no language but their own; after a few minutes we formally took our leave, Colonel Anderson, an English officer on duty with the Mâhârajah, and who commanded all the native troops in the contest a few days before near Delhi, and for which he received much praise for the manner in which it was performed, made all arrangements for these visits. Scindia of Gwalior stood very high in the estimation of the Government of India, and ruled over the most important native State. Lord Dufferin had but a few months before restored to this prince, with much ceremony, and in the presence of the leading native princes of India, his native stronghold and fortress of Gwalior, *as promised him* by the English Government many years before, for his subsequent loyalty and fidelity. This prince has since died, and a valuable treasure of many millions of rupees has been found buried near his palace. The English Government has borrowed it, for which they pay a certain interest during the minority of his successor.

The next day a few of us accepted an invitation to make the tour of the "Ridge," and listen to the story of the siege of Delhi during the great mutiny, as told and explained by two participants in that siege, who were subalterns all that time—Colonel A. E. Perkins, R.E. A.D.C. to the Queen, and Colonel Minto Elliott, R. A., Adjutant-General of Artillery for India. Many explanations and locations were pointed out in going over the ground, which could not be gained otherwise; I enjoyed the privilege and instruction very much.

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January 19th, a day or so after the above events, was the day appointed for the Grand Review or "March Past," as it is called in the English regulations, in which His Excellency the Viceroy would review the troops previous to their departure for their stations throughout Northern India, opportunity being taken of this occasion for the usual change of stations, which takes place among some of the troops every year.

The review commenced at 11 A. M. on ground some five miles from Delhi, and where the Prince of Wales reviewed a portion of the Indian Army in 1876. The review was unfortunately marred by heavy and continuous rain during the entire day. The Viceroy, attended by the Commander-in-chief with staff and foreign officers, rode down the line at 11 A. M., all officers saluting with the hand, the British colors carried by each regiment or organization as we passed. I was impressed with the attention paid to the saluting of the colors by officers on all occasions and under all circumstances when passing, a fact which I think we might pay a little more attention to; if I may be excused a slight digression here, I have been surprised when travelling in Europe and the East on other occasions to see the manner in which the American flag is permitted to be used as an advertisement, and in Hong Kong, while looking for the American Consulate, I was attracted to a place over which floated a beautiful new American flag forty feet long, perhaps, on an immense pole, which I thought surely must be the consulate, but which I found was a groggery and sailors' boarding house. I have never seen the flags of other countries used for such purposes.

The following is the order in which the procession passed down the line,—if you will pardon my giving these details, which you do not find laid down in the books, and surely nowhere in our regulations do you find any guide for a similar occasion or ceremony: Captain Gartside-Tipping, quartermaster of the camp, an officer of the intelligence department leading, followed by a detachment of the Viceroy's body-guard: the aides-de-camp of the Viceroy and Commander-in-chief; the staff of the Commander-in-chief inversely according to rank; the Viceroy and Commander-in-chief; the Governors and Lieut.-Governors of the Presidencies and Provinces present on the occasion; Lord William Beresford, military secretary to the Viceroy; foreign officers and general officers not in command of troops; officers of the Umpire staff under the rank of brigadier-general; personal staff

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of Governors and general officers and the volunteer delegates. The escort of the Commander-in-chief, the 17th Lancers, closing the procession.

The total force reviewed on this occasion, of all ranks, was over 35,000, being 15 regiments of cavalry, 20 batteries of artillery, 38 battalions of infantry, including one volunteer battalion, and 4 regiments of cavalry, 5 batteries of artillery, and 5 regiments of infantry from the native states of Cashmere, Pattiala, Jheend and Nabha. There were 130 guns, 9,000 horses nearly, 500 mules, 300 bullocks and 25 elephants. The line was 3,000 yards long, and took more than an hour to pass around; the rain pouring furiously all the time, drenching impartially the Viceroy, the distinguished generals, staff and foreign officers; many beautiful uniforms were ruined on that day. The troops were formed in two lines, the infantry in front in line of quarter columns of double companies; in the second line, the Royal Horse Artillery on the right with the cavalry, and field, mountain and elephant batteries on their left, in the order named; the artillery in line of batteries at half intervals, and the cavalry in quarter columns. After completing the inspection, the Viceroy, accompanied by his staff, foreign officers and escort, returned to the flag-staff, which marked the point opposite the centre of the line, and sufficiently far from the line for the "march past" to be executed. The foreign officers on the right and rear of the Viceroy, the staff of the latter directly in his rear.

In rear of the reviewing party was the Viceroy's body-guard and Commander-in-chief's escort. The massed bands of the different corps were opposite the reviewing point, and at sufficient distance to permit the column to pass between them and the Viceroy. The bands did not accompany or lead the troops, but took up the cadence as the head of the column approached the saluting point, and at 200 yards distance therefrom. The bands exchanged and played for the marching past of their own organizations.

The Commander-in-chief and generals commanding separate army corps *only*, with *one* side turned out of the column after saluting, and placed themselves alongside the Viceroy, the aides in rear of the Viceroy. The other general officers, with their staffs, wheeled out of column after saluting, and took post on the opposite side of line of march, facing the Viceroy, until their commands had passed.

The march commenced first with the Northern Army, then the

Southern Army and Native Contingent. The order of march was horse artillery and cavalry by brigades; field, mule and elephant batteries by batteries; the sappers and miners by companies, and the infantry by divisions and brigades. The artillery in column of batteries at closed intervals (wheel to wheel nearly), the cavalry in column of squadrons, and the infantry in column of double companies.

General Sir Frederick Roberts, Commander-in-chief, *preceded* by Army headquarters staff, led the column, which was more than two hours in passing, the rain at intervals pouring down in torrents, which after the mounted troops had passed, had reduced the ground in front of the saluting point to mud more than ankle deep, which made the marching for the foot troops very difficult indeed, and particularly for the Native troops, all of which are not equipped with the ordnance boot, but wear a light-pointed low shoe, not unlike a slipper, turned up at the toe and heel, and with no fastening to the foot; never intended for thick mud. Many of these shoes pulled off just in front of the Viceroy, where the mud was the deepest, and could not be avoided. The men, rather than lose their shoes, which possess a value to them, fell out of ranks and picked them up. This ludicrous feature, to a certain extent, broke up the perfect alignment of some of the subdivisions just at this point. This equipment of the native soldiers is undoubtedly defective, and I can't conceive of a more thoroughly satisfactory way of bringing it to the notice of the authorities than on an occasion of this kind. It will, no doubt, receive early correction. After marching past, as above, the infantry reformed on the original line, and the cavalry and artillery trotted past in same order. On account of the rain and mud the passage of the horse artillery and cavalry at a gallop was dispensed with. The troops then reformed on the original line, when the whole force of 36,000 men, etc., advanced to the front some hundred yards or more, with bands playing. The line halted, the Viceroy, staff, foreign officers, etc., rode forward and were received with a present arms and royal salute of artillery. The Viceroy addressed a few words to the Army, which could be heard of course, only by the few near him. His remarks were published to each regiment the following day. He expressed his entire appreciation of their splendid fitness and soldierly appearance under the disadvantageous circumstances, etc., etc.

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This terminated the review; the troops were marched to their respective camps some few miles distant, and we galloped to our camp some four or five miles away for dry clothing and something to eat. Without entering into a detailed criticism, I find I noted the following: The perfect steadiness, smartness (in the English sense) and admirable turnout of the artillery on this occasion. Though the horses slipped badly in the mud, yet a perfect alignment in line of batteries was preserved *at all gaits*, and at the trot not a horse in any battery was out of gait, all keeping time with the music. The cavalry was creditable, notably the 8th Hussars, Col. Langtry's Regiment, the 10th Bengal Lancers, the 18th Bengal Cavalry and the Central India Horse. Of the infantry, the Highland Light Infantry, the Seaforth Highlanders, who wore kilts, the Sikh and Goorkha regiments impressed me most favorably by their marching.

In the evening the Commander-in-chief gave a reception, to meet the Viceroy and foreign officers, all prominent officers and civilians were in attendance, notwithstanding the rain, which still continued during the night.

The Viceroy was present, much to my surprise, considering what he had been through during the day, mounted upon his horse all day in the rain, dressed in a thin black frock coat, light trowsers and black silk dress hat; would permit no other covering while the troops were passing, though drenched with the rain. His family was most anxious concerning him, as he had just risen from a sick bed to be present on this occasion, and as he had to ride several miles in the rain and at night, I thought it a marked compliment to the occasion that he should have again appeared.

Early the next morning the Viceroy took his departure for Calcutta. His leaving was attended with the usual ceremonies, the entire distance of the road traversed by His Excellency from the quarters he had occupied to the railway station, was lined on both sides by British and Native troops. The Commander-in-chief, his staff, general officers, foreign officers and others were present to say good-bye.

As the Viceroy arrived on the platform a royal salute was fired, followed by the band playing the national anthem, after which cordial adieux were said, and we saw no more of His Excellency until we were received by him at Calcutta some days later.

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The next few days were spent in sight-seeing in and about Delhi, and in witnessing various ceremonies, competitions and sports of the troops. Under the patronage and orders of the Commander-in-chief, and a committee of officers designated for the purpose, various sports took place between the men for money prizes as high as $50.00 each. Mounted sports—Lance *vs.* sword, lance *vs.* lance, sword *vs.* bayonet, etc., etc. Infantry—Bayonet *vs.* bayonet and sword, parallel bars, horizontal bars, British and Native Cavalry—Tent pegging, with lance and sword, lime cutting, tilting at the ring. The prize from the Commander-in-chief for the best tent pegger was a watch.

Artillery driving competition: Prize, entrance money and a watch to No. 1 (chief of Detachment with us) of the winning team R. H. Artillery, and watch to No. 1 of the R. A. team, presented by Commander-in-chief. Entrance fee $2.00 per team.

This was decided by placing small mounds of earth or sand opposite and a few inches further apart than the width of the wheels of carriage, arranged in the form of a parallelogram. The piece with six horses, cannoneers mounted on the chests, moving *at a gallop* was to pass between these mounds, making all the turns, and returning to the point of starting without touching them. A very difficult thing to do. I saw in this exercise the great advantage of having one of the wheel horses in shafts, where such accuracy of driving is required, and this was the only advantage I could see. In the field this exactness would not be required, and the system has many objections.

Tent pegging, for officers: Prize, entrance money, $2.00 entrance. Imagine my surprise when I saw Sir Frederick Roberts himself enter for the prize. He rode against two of his young aides, and by the way, won the prize. I doubt if in any army in the world other than the English you would find a general officer commanding an independent army, and of the size of the Indian Army, and at his age, that would risk his reputation for horsemanship in the presence of forty thousand of his troops in a tilt of this kind. He replied to me afterwards in referring to it, that he had been practising in exercises and sports of that kind all his life, here in India. I had had reason, as I said before, to know something of his horsemanship and endurance, in our efforts to keep up with him in his rapid movements from one flank to anoher during an engagement in the field.

Sir Frederick, I should say, is a man about 55 years of age,

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not more than five feet, five or five and a half inches in height, with slight, trim, soldierly figure. He has served all his life in India and the East, and is immensely popular. He is exceedingly courteous, modest and unassuming in his manners and address. He had recently been promoted from Lieut.-General and in command of Madras Army to the Commander-in-chief in India. He will be remembered by us as in command of the Relief Army in 1880, in Afghanistan, and in executing that wonderful march from Cabul to Candahar under Sir Donald Stewart's direction, the latter general, by the way, Sir Frederick relieved as Commander-in-chief in India just before the beginning of these manœuvres that we are talking about.

Sir Frederick had a most efficient, so far as one could judge, and delightful staff about him. Of course, we all know that there is no permanent or fixed staff in the English Service or in India; all officers are detailed for staff duty and for a period not longer than five years.

His adjutant-general is a lieutenant-colonel of the line, enjoying the local rank and pay, etc., of a major-general while performing this duty.

His quartermaster-general is a major of artillery enjoying the local rank, pay, and of a major-general, and so on.

Many of the younger officers of his staff had seen service with him in Afghanistan—his Chaplain, Rev. Mr. Adams, was a Victoria Cross man, gained while with Sir Frederick in a previous campaign. He was one of the best riders and horsemen on the staff and besides preached a good sermon. Service on Sunday is strictly observed in the English Army, we all know, whether in field or garrison. Several different services were held every Sunday in the field, which officers and soldiers could attend according to their own preferences. The headquarters service of course, is the Episcopal service.

The foreign representatives were duly informed of the hours, place and character of service, that each could attend; I expressed the intention of attending the Episcopal service in Sir Frederick's camp, upon which one of the Russian officers remarked good naturedly that he thought all good Americans attended the Mormon Church.

Firing competition, for Royal horse and field artillery. This was for a prize of £25, to be devoted to the purchase of a nomination in the corps of Commissionaires for the benefit of

the winning team. It was offered by the Director-General of Ordnance, with the sanction of the Commander-in-chief in India, and was competed for under the following rules or conditions, which it may be of interest to us to know, as we are going to have a light artillery school. I was the only representative of the foreign officers present, as none of the others took much interest in matters of this kind, purely artillery. I ascertained that the competition would take place on ground some five or six miles back in the country, to which place I rode.

Conditions: One subdivision (piece with its caisson) of each horse artillery and field battery, the gun detachment and drivers to be selected from the battery by the major commanding. Four rows of targets (boards) 6 yards apart, each row 120 feet long, 2 feet high, representing the main body of a battalion of infantry in attack formation, were erected at an unknown distance, and the prize to be won by the subdivision making the greatest number of throughs. The competing subdivision to be drawn up at a distance of half a mile from the firing point, and to advance in turn into action, the horse artillery at a gallop, the field artillery at a trot, and to fire ten rounds, provided the limit of time was not exceeded, of shrapnel shell fused with fifteen seconds time fuses. Time allowed, 15½ minutes for horse artillery, and 16¾ minutes for field artillery, counting from the moment of starting from the first position, firing to cease on the expiration of the allotted time, whether the whole ten rounds had been expended or not. The range was to be found, if desired, by the battery range takers within the time allowed, or by trial shots of common shells and percussion fuse, but in the latter case these rounds were to be deducted from the maximum number of ten rounds allowed.

A committee of officers were detailed to carry this out. The subdivision to be in "drill order" with all the ammunition, stores, etc., carried in their proper places, no preparation of fuses or tangent scales, etc., being permitted.

The shrapnel shells were filled with 63 bullets each, making a total in the 10 rounds of a possible 630.

The range takers, three men mounted, carrying the Watkins Range Finder, at the signal for the subdivision to advance, move forward at a rapid gallop to the point indicated by a flag, where the piece is to halt and fire. They are supposed to arrive there in sufficient time in advance of the gun to get the range,

but this was not always accomplished, in fact, very little reliance was placed upon this method of getting the range, or of any other range finder yet known that can be conveniently carried, and for this kind of fire. The range was usually determined by trial shots. The first gun only put 15 bullets through the half inch boards, the next put in 65, and so on. The prize was won by B 3 (field battery) making 245 throughs.

THE MILITARY INSTRUCTION OF OUR YOUTH AND CITIZEN SOLDIERS, AND THE USE TO BE MADE OF THE REGULAR ARMY IN ACCOMPLISHING THIS OBJECT.*

By SECOND LIEUT. FRANK EASTMAN, U. S. A.,

Fourteenth Infantry.

TO enable our nation to successfully resist the attacks of an enemy, we must have a large standing army, plenty of time, or be able to place in the field large numbers of organized, armed and trained volunteers or militia.

The first proposition is contrary to the spirit of our Government and is, therefore, impracticable.

In these days of rapid transit, the second requisite—time—would not be allowed us by the enemy.

Then we *must* be able to place in the field large numbers of organized and instructed volunteers or militia, and the most important questions in the military administration, or policy, of our country to-day, is the adoption of some practicable scheme for the instruction of our youth and citizen soldiers in the duties of the modern soldier, and the use to be made of the Regular Army in said scheme.

To make a man an efficient modern soldier, he must be instructed in, 1st. Target practice, including estimating distances. His value as a soldier is almost determined by his skill in the use of his rifle.

2d. Squad drill, the object being the control of the individual in motion.

3d. Manual of arms and care of rifle.

4th. *Setting up* drill and other physical training.

These are classed as *individual*, because, although two or more may be drilled together, or at the same time, the object is *individual instruction.*

Fifteen years ago, target practice was regarded as of little or

* Read before the Vancouver Branch, M. S. I., Jan. 6, 1890. For Discussion on this paper, see "Comment and Criticism."

no importance, and the man who could hit the target at two hundred yards—off hand—with the U. S. Springfield rifle, two times out of five, was regarded as an excellent shot. Such is not the case to-day, and the instruction of the soldier in the skillful use of his rifle is now very properly considered of primary importance.

The long range, magazine or breech-loading rifle cannot be used effectively without much practice, backed by self-control and good, sound shooting sense.

The soldier should, therefore, receive thorough instruction in the pointing and aiming drill. He should be practised in assuming quickly the different positions for long range firing, and be especially drilled in rapid loading, dummy cartridges being used, in each position. I regard rapid loading a very important part of a soldier's instruction, and it is of special importance when range firing is impracticable; but the ability to load quickly can be acquired only by much practice, and is then of but little value unless accompanied by self-control and the skill to estimate distances accurately.

Gallery practice is beneficial and every man should receive some instruction in such shooting. It could well and profitably take the place of two and three hundred yard practice during the first two years of the first enlistment.

Estimating distance drill is of very much importance, and, in the proper instruction of the citizen soldier, is becoming of more importance every day. Particular attention should be paid to this part of his military education. Every man having an aptitude for such work should exercise his gift on every possible occasion. Officers and non-commissioned officers ought to be experts.

The squad drill by non-commissioned officers is of vastly more importance now than formerly, because in this drill soldiers must be trained to obey the commands, and submit to the control, of the non-commissioned officers. This has become of special importance on the line of battle, as these chiefs of sections and squads must now, more than ever before, maintain discipline and control, and must be especially responsible for the proper expenditure of ammunition. Volley firing by section, or squad, will, in my opinion, prove very effective, and be of great value as a means of regulating this expenditure.

With the old muzzle loading rifle the number of cartridges which could be expended by each man in the longest battle was limited, and the question of supplying ammunition was comparatively

simple; but to-day this problem is one of great interest and importance, second only to that of how to prevent waste of cartridges in battle.

In the squad drill, the sergeants and corporals should be the instructors. The captains and lieutenants should not do the duties of their subordinates. The efficiency of any company depends to a very great extent—more so now than ever before—upon the efficiency of its non-commissioned officers, but *they can become efficient* only by acquiring the habit of command and the exaction of obedience to their commands.

The manual of arms is important as a means of educating the muscles and nerves of the arms so that the piece may be easily handled, and the more perfect the rifle—or any other machine—the more necessary is its intelligent and careful handling to keep it in a serviceable condition. It is necessary that the soldier be thoroughly instructed in the mechanism of his piece.

Every one will acknowledge that physical training is a very important part of a soldier's education, and a well-equipped gymnasium should be provided at every military post in the country. Such training improves the health, increases the strength and gives self-control—all important qualities in a soldier.

Besides the above instruction, the soldier must be drilled in the platoon, company and battalion to determine his relative movements, and to teach him to act in concert with others. Of course a soldier must, while in service, do many things besides marching and fighting.

The military drill and discipline of our citizen soldier should begin in the primary schools of our land, and be continued through all the different grades up to, and including, our high schools and colleges. They ought to be a compulsory part of the course in all our public and private institutions of learning, because the *perfect soldier* must be physically, intellectually and morally a *perfect man;* therefore his physical, intellectual, moral and military education ought to begin early and continue hand in hand from boyhood till manhood. A soldier has much to learn. Time is, therefore, important, and should be improved to its utmost in his military education.

How shall the instruction be apportioned to the various schools and colleges?

The physical drill should begin in the primary school and be

continued through all grades and in the colleges, universities and normal schools.

Target practice would be impracticable in the primary and grammar schools; but in the high schools, gallery practice to a limited extent, estimating distances and pointing, aiming and rapid loading could be practised, and made both interesting and profitable. By using wooden rifles, which could be furnished by the general or State government at very small expense, the boys in the high schools and grammar schools could be very thoroughly instructed in the manual of arms, guard duty, squad drill, and in many of the simple and important platoon and company movements. Schoolboys take great interest in such drills, and the return to the Government in the shape of military instruction and discipline imparted would greatly exceed the outlay or cost.

Simple tactical movements, such as the formation of column, marching in column of fours, twos and files, and the formation of line from column, could be executed. Such drill would prove of practical utility in case of fire, street parades, etc. All these movements may be executed, of course, without arms.

By a system of commissions and warrants issued to the captains of companies, chiefs of platoons, sections and squads, much emulation would be excited, healthy physical exercises would be provided for and encouraged, a military spirit and a manly bearing would be cultivated, and candidates for appointment to the U. S. Military Academy could be selected—other things being equal—from those showing special aptitude and fitness for the military profession.

In the normal schools, universities and colleges, the course of military drill and discipline should be as extensive and complete as possible *without interfering with the purpose for which the schools were established.*

Platoon and company movements should be practised, and at all State universities, where practicable, suitable target ranges should be provided by the State, and the United States should furnish the necessary arms, ammunition and instructors.

At the normal schools many teachers would receive the necessary instruction to enable them to establish the course of military training and discipline prescribed for their grades of schools.

After consultation with the educational authorities of the several States, carefully prepared *manuals* should be furnished by the

Government for the establishment of a uniform system of instruction in military drill and discipline suited to the needs of the various grades of the schools and colleges to which they may be furnished.

Now an important problem presents itself. To partially educate in the military profession large numbers of boys and young men—our future citizen soldiers—large numbers of skilled instructors will be required, and where shall we get them?

In civil life, the various State normal schools furnish the most skillful teachers, and so these military instructors should come from the Regular Army, the normal school of the military art and science.

Except at a few colleges and universities, the duty required would be that pertaining to the grade of non-commissioned officers, *i. e.*, the individual instruction of the soldier. The instructors required should, therefore, be chosen from the non-commissioned officers of the Regular Army. The duty will be an important one from the nature of the work required, the responsibility and trust imposed, and from the fact that the character and utility of the Army will be judged by the conduct of these instructors. The instructor should, therefore, have an excellent moral character, should be young and intelligent, have a high sense of honor, and be faithful and honest.

Have we now non-commissioned officers fit for the work, responsibility and trust? If not, how can they be obtained?

Evidently, the pay of the non-commissioned officer and the partial military education obtained while in the Service, are not worth the time and labor. In our small Army, with its exceedingly slow promotion, the hopes of winning a commission cannot be offered as an inducement for large numbers of intelligent young men to enlist. *What can be offered?*

In the last report of the Secretary of War, he says—in another connection—"Give the soldier an opportunity to so improve himself that when he leaves the Service he may be better fitted for civil life than when he entered it." Taking those words as a key, I submit my answer to my question.

Offer as a reward for faithful service for a limited time in the Regular Army an opportunity to acquire an excellent education, with the additional inducement of a chance to obtain a commission by the development of marked fitness for the military profession.

How shall this be done?

Enlist, for the term of three years, two or three thousand intelligent young men—the more the better—of excellent character, apportioning them, if possible, to the different Congressional districts. During the first two years—three, if necessary—drill them thoroughly in all the duties of the private soldier and non-commissioned officer, giving them additional instruction in signalling, topographical map-making, and company and post clerical work; then re-enlist for three or four years such of them as may prove themselves fitted for the work, and send them to our high schools, normal schools, universities and colleges, as military instructors. *There they would be able to acquire an education—tuition free. During time out of study and recitation hours,* they can be required to engage in the legitimate duties of their grades, imparting important military instruction to the other pupils of the schools. At the termination of their re-enlistment, they shall be discharged to return to civil life better men than when they left it.

The advantages resulting to the individual from a six years' enlistment in the Regular Army may be thus summed up:

A livelihood. This includes food, clothing, medical attendance during two years of his service, and pay such as to enable him to save something with which to establish himself in the business or profession of his choice.

Thorough physical education and regular habits specially adapted to preparing him for a college course requiring great application of his intellectual powers;

The acquisition of the habits of obedience to, and respect for, superiors, and also the habit of command;

In general, a higher social position than that to which he has been accustomed;

An opportunity for the acquirement of a college, university, normal school or high school education; and,

A military education such as to qualify him to take a prominent, and perhaps a leading, place in the National Guard of his State, and in case our country should become involved in war, place him in a position to distinguish himself in the service of his country.

With such advantages and opportunities presented to him, many a young man of intelligence and ambition would enlist, the Government would assist a meritorious class of young men in acquiring an education, improve the *morale* of the Army, diminish

the number of desertions, and at the same time, obtain the necessary instructors for the citizen soldiery.

I have pointed out how the general government may provide the necessary instructors for its citizen soldiers from its military normal school, the Regular Army; but the State must now provide, or furnish the pupils to be instructed, and if the general government fail so to do, must fix or provide for the suitable organization of its military strength.

The boys of every primary school, grammar school and high school can be organized into squads or platoons of cadets, the non-commissioned officers of which might receive warrants from the State, and these non-commissioned officers, under the direction of the teachers or the instructors furnished by the Government, should be required to drill these squads and platoons in a prescribed course of military exercises suited to the ages of the cadets.

In the colleges, universities and normal schools, all male pupils between certain ages should be enrolled for the purpose of instruction in the State militia, whether residents of the State or not, and be organized into platoons, companies and battalions (if numbers permit), and these platoons, companies and battalions ought to be drilled by the instructors furnished by the Government in a prescribed course similar to that of the cadets but more extensive. (Uniforms are desirable but not necessary.)

State legislatures can enact such laws as may be necessary to put in operation the proposed plan of organization and military training, and to authorize the executives of the States to ask the general government to furnish the necessary instructors.

If the foregoing proposition be impracticable, then let each State, assisted by the Government, offer an inducement to the pupils of the colleges, etc., to voluntarily enroll themselves in the militia. *Let this inducement be made in the shape of assistance in obtaining an education.* This aid can be extended in various ways which will suggest themselves.

If each young man were paid ten cents per hour for a certain number of hours per month during his term of attendance—this time to be devoted to military drill—many a deserving young man would be assisted in acquiring a much prized education, and the State would soon have within its borders a large number of young men partially disciplined and very thoroughly instructed in many of the duties of the modern soldier. *A little investiga-*

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tion will show that even sixty cents per week goes a long way toward defraying the expenses of many a young man while obtaining an education.

The Regular Army is supposed to be the basis of military organization in case of war. It is supposed to be a school for officers, one specially fitted to prepare them for the duties and responsibilities of comparatively large commands, and to fit them for the performance of very important staff duties in the field.

Until recently, the great number of posts giving independent commands, the performance of staff duty by the subordinate officers at these same posts, the numerous Indian campaigns, scouts and hunts, all helped to develop good practical soldiers of large experience, and the officers and men were engaged in legitimate military duty. The great masses of the people knew this, and recognized the necessity of having a *regular army*.

But times have changed. The small posts are rapidly disappearing and with them the independent commands and the schools of staff duty. The Indian campaigns are practically a thing of the past. The scouts are no longer attended with danger and made over or through an unknown country, and the hunts are no longer for the deer, antelope, buffalo and bear.

In fact, the practical part of army life as a school of instruction is gone. All that remains are the endless drills with corporal's guards called companies. Captains, as a rule, no longer have independent commands, and the principal duties of the lieutenants—average age thirty-five or forty years—are to drill these same corporal's guards; to go on *officer of the guard* about once in five days (one-fifth of one's time spent in the guard house!); to write up *proceedings* in "*guilty*" cases tried by garrison courts-martial and to recite lessons in tactics which have been in use for twenty years. These duties come day after day, week after week, month after month, and year after year. Commanding officers are puzzled to know how to employ their subordinates. Department and division commanders are likewise concerned, and the people are beginning to wonder what the Regular Army is good for and to believe they can just as well get along without it.

It seems to me it would be well for officers to recognize the actual condition of affairs, and for them to take the lead in introducing radical changes—called innovations by some—in the organization, drill, discipline and uses to be made of the Regular

Army. If they don't, we may wake up some day from our Rip Van Winkle sleep to find our occupation gone.

As a result of all these facts and feelings, various projects are proposed to give us something to do. Summer marches and camps are ordered. The Secretary of War recommends "the establishment at each post of a school in which shall be taught the elementary branches of mathematics, science, mechanics, surveying, engineering, drawing," etc., and adds, "all officers are qualified to supervise or do this work." (?)

In other words, the Secretary proposes, practically:

First. That school-houses or rooms, text-books, school-room furniture, etc., be furnished at considerable yearly expense to teach soldiers what they don't want to learn and what has almost nothing to do with the practical, every-day duties of an enlisted man in time of war; that these men shall, at the same time that they are studying and reciting in these different branches, also perform almost all garrison and company duties. 'Tis proposed to do all this when the country is full of schools already thoroughly equipped and established for just such purposes.

Second. To use army officers as teachers in these post schools, to use them for purposes for which they were not educated and for which their profession peculiarly unfits them; to use men experienced, or educated, in the Art and Science of War for purposes requiring a knowledge and experience in the art and science of education; to use men receiving from one hundred and sixteen to one hundred and seventy-five dollars per month to do the work for which skilled teachers in civil life receive three-quarters as much; to use men as teachers of elementary branches of education whose every minute should be, and could be, usefully employed in legitimate military duties and studies calculated to fit them for large commands and great responsibilities in time of war.

Such a course would undoubtedly spoil good officers and soldiers to make poor teachers.

In a few years, the captains and a great many first lieutenants will be unfit, physically, for active campaigning, and the remainder of our line officers are being unfitted as surely and as fast as possible for responsibility and command by reason of being kept, during the best years of their lives, engaged in unprofitable and insignificant duties, without responsibility and without command, everything repression and humiliation instead of encouragement and commendation.

The Army is organized for fighting, and the regular officers are the proper instructors in the Art and Science of War. Then use them in legitimate ways:

During the first four years of their service, in acquiring a thorough, practical, individual knowledge of all the details of Army drill, discipline and administration.

During the next four years, give them a post-graduate course of advanced study in the higher branches of the military science, and in the pursuit of specialties for which they may have developed aptitude.

By this time, by reason of age, experience, and education, officers would be fit for duty as military attachés at foreign courts, duty on the staffs of governors of the different States, detail as military professors in colleges, universities, and as inspectors of camps of instruction for the National Guard, each officer according to his fitness for one of the several duties mentioned. During this time, they would acquire a broad knowledge of human nature, be brought into intimate contact and sympathy with the people and its National Guard, and gather up and store up valuable military and personal knowledge of our country, people, productions, etc.

At the end of this last period, they could return to the command of their companies, to which they would probably be promoted by this time—or ought to be—to do such duties as might be required of them, to enjoy these blessings and comforts of home and family life, and qualified for almost any emergency of military life.

ORGANIZATION AND DRILL.

Undoubtedly uniform systems of organization and drill should be established by Congress.

These should be such as to meet, as perfectly as possible, the conditions and requirements of modern war, a war in which battles will be fought with long range magazine rifles, Gatling guns and like instruments of death.

While meeting the above requirements, it is very important that the smaller units of organization, together with their drill, shall be specially adapted to the needs of the country with reference to the rapid organization and drill of the volunteers and militia.

It has been proposed to re-organize our Regular Army on some such plan that it may be increased, in case of war, to a war footing by filling up skeleton companies and battalions with enlisted

men, and sending these companies and battalions into the field under experienced or educated officers. In theory this plan is a good one, and, if it could be carried out in practice, would probably prove the best; but, unfortunately, volunteers and militia will not serve, at first, under regular army officers.—Our volunteers must go to war under officers of their own choosing—it is a political necessity that they should.

To be adapted to the needs of the National Guard and to a comprehensive plan for a general military instruction of the youth of our country, the unit of instruction ought to be small—a platoon of fifty men, more or less. Three platoons should constitute a company, three companies a battalion and three battalions a regiment.

By unit of instruction, I mean that unit of organization in which the individual instruction of the enlisted man is completed, in which all his individual and relative movements as a fighting machine shall be determined, and that no movement, relative or individual, which shall be required of him in any of the larger units, can be one which has not been required of him in this smallest of units. This unit of fifty men or less would be adapted to the needs of the country, in that in nearly every village, enough young men and boys can be found who are not only willing but anxious to form, organize and drill as a platoon. The boys of each school could be so organized and drilled. Large numbers of these small bodies of partially instructed men in the villages and cities would prove of great value in case of war.

The chief of this unit ought to be a lieutenant and be responsible for all individual drill, my idea being that the captain should have matters of more importance to think about, and attend to, than the position of the little finger in executing *arms port* or *trail arms.*

The drill tactics of this unit ought to provide for a rapid formation of column, a few simple and natural changes in the column formation, the quickest, the most simple way of passing from the column formation into the fighting formation—the line—facing to the front, flank or rear. This drill ought to be suited to all street formations and movements, whether civil or military; to the drill and movements of our police forces; to entering and leaving buildings; to obstructed streets and narrow alleys; to the needs of the schools as a fire drill, and to street fighting in cases of riot or disturbance.

The next question to be considered is the instruction of the organized National Guard, and certain facts must be remembered in treating this part of my subject, viz.:

The National Guard is now composed principally of young men. Many of them are possessors of wealth, education and refinement, all are very intelligent and the most of them have a natural aptitude and taste for the military profession.

It is composed, to a great extent, of men whose time is very much occupied by business and professional pursuits and social duties.

Its officers are—they must be under the circumstances—men of social standing, great tact and possessed of special aptitude for the military profession.

The instruction of the National Guard during the greater part of the year, must be confined to the limited space of an armory.

The short time available for practical outdoor drills, target practice, marches and encampments; and, that the members of the present National Guard go to considerable personal expense in the way of purchasing uniforms, paying their own transportation to and from encampments, and providing themselves with armories, fitting up the same, etc.

Such being the present state of the National Guard, it follows that if the Government furnish them with instructors, officers or non-commissioned officers, *it must be by request;* that they ought to be selected from the most competent in the Service, and that the instruction must be imparted by means of lectures, suggestions and criticisms on drill, etc., *when asked for*. The adjutant of every regiment of the National Guard, numbering not less than five hundred men, might well be a regular army officer, selected because of his qualifications for the position. If well posted, he could profitably devote his entire time to that regiment and the information imparted by him would be very valuable. Non-commissioned officers might also be detailed, of course, from the very best in the Service.

For instruction in target practice, the State should provide, at suitable places, one or more target ranges completely equipped, and the commanding officers of all military posts should be ordered and required, except during the regular practice season, to place their ranges at the disposal of the National Guard, and to detail competent instructors to assist them.

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To these ranges, companies, platoons, sections, squads or individuals should be sent—in uniform or not, at their own option—at times most convenient, there to obtain as much range practice as possible. The practice should be confined to five hundred, six hundred and eight hundred yards—gallery practice in armories can take the place of the two and three hundred yard practice. The former (and longer ranges) will be the battle ranges.

To make men good shots at the shorter ranges, much ammunition must be expended to toughen the shoulders, strengthen the arms, and cultivate the necessary steadiness of nerve. The back position should be practised as being of special value for street fighting.

When ammunition is limited, and time which can be devoted to practice is short, 'tis better that a few men in each platoon be thoroughly instructed than that all should have a little practice each. It is better that one man fire fifty shots than that ten men fire five rounds a piece, skillful shots ought to be detailed from the Regular Army for duty on the State target ranges.

Position drill, rapid loading drill, gallery practice, setting up drill and other physical training, squad drill under non-commissioned officers, platoon and company drill, should receive special attention in armories during the winter months, when out-door practice is impracticable; and, as a preparation for summer encampents, lectures might well be given concerning guard duty and picket duty, the proper care of arms while in camp, and camp hygiene—more men die from disease in camp than are killed in battle. Signalling ought to be practised by a few picked men—preferably telegraph operators—until proficient.

PRACTICE MARCHES.

These must be short, if any be required at all. Time is too limited, and the work too hard to pay for the small amount of practical benefit received.

SUMMER CAMPS OF INSTRUCTION.

Time being necessarily short, no drills or exercises should be required which are practicable in the armory. Skirmish drill, guard duty, estimating distance drill, signalling to a limited extent, long range rifle practice when practicable, and company and battalion movements not practicable in the armory, should constitute the programme, and orders concerning the police of the camp should be rigidly enforced.

The Regular Army officers on duty at colleges and on the governors' staffs could act as inspectors of rifle practice, of summer camps, etc. They also would be in a position to give the National Guard valuable information, *when asked for*, by lectures, suggestions, etc., and at the same time collect and furnish the Government important data of a military character.

The next question to be considered is the cost to the government, State and general, which will result from the adoption of some such plan as I have suggested. This can be determined only in a general and comparative way.

PAY.

The pay of the National Guard can only be such as each State, or the Government, or both, may judge wise.

ARMS.

The Government must have large numbers of rifles and equipments on hand to be prepared for war, and a good share of them can well be in the hands of the National Guard, at colleges, universities, normal schools, with a few available for the instruction of the pupils of the high schools in the pointing and aiming and rapid loading drills.

Thousands of wooden guns could be readily manufactured and furnished the States at cost—or issued free—for use in the schools, etc. They would last for years, and would cost but little.

AMMUNITION.

Nearly one-half of the ammunition used by the Regular Army could be used, as a means of instruction, to better advantage by the National Guard, because nearly all practice at two hundred and three hundred yards during the first and second years of the first enlistment should be dispensed with as unprofitable—gallery practice taking its place. All range practice by men who have qualified as sharp-shooters or marksmen for two or three years, except by those chosen to represent their companies in department competitions, could well be dispensed with as being of little additional value in their military training, these men being—during the remainder of their enlistment—classed as sharp-shooters or marksmen. All officers below the rank of captain, and less than forty years of age, who have qualified any three years, should be classed accordingly without further shooting. All officers over

forty years of age ought not to be required to practice, unless of their own free will, for this practice may be dispensed with as unprofitable.

The ammunition thus saved would go a long way toward supplying the National Guard with what it could use to good advantage; and, by furnishing reloading tools, they would have all the ammunition they could profitably use in target practice.

RANGES.

I may safely say there are many cities and towns in every State, each willing to build in its vicinity, and keep in repair at its own expense, a target range, drill and camp grounds, on condition that they be used yearly by the various military organizations of the States for range practice and *camps of instruction.* It would be a good business investment for them to do so. Several ranges could therefore be provided in large States, and the cost of transportation be reduced to a minimum. The Government ought to sell range material for such ranges at cost price or furnish it free.

TRANSPORTATION.

The transportation of non-commissioned officers to colleges etc., would cost but little, if any, more than the post schools with their furniture, books, etc., as proposed. The rifle ranges being properly located, the cost of transporting the National Guard to and from them would be reduced to a minimum as the railway companies generally give reduced rates to such organizations.

The advantages accruing to the Government from the proposed plan may be enumerated as follows:

First. A rapidly increasing body of thoroughly drilled, disciplined, educated and practised non-commissioned officers and soldiers employed in the pursuits of civil life, but bound to the Government by ties of gratitude.

Second. Large numbers of young men, partially educated, at schools, colleges, etc., in the duties of the modern soldier.

Third. A large proportion of the Regular Army would soon be young, ambitious Americans, having so much at stake that desertions and trials by courts-martial would be reduced almost to a minimum, and the Army would be much more efficient and popular.

Fourth. A much more efficient body of educated officers, well

acquainted and in sympathy with the people and its National Guard.

Fifth. The officers and non-commissioned officers of the Regular Army would be given occupation in the legitimate military duty of educating themselves and the soldiers of our future wars in the Art and Science of War. The Regular Army would thus become the American War College of our citizen soldiers, and the instructors therein, the officers, would have every opportunity to become the most efficient leaders and commanders possible, without actual experience in war.

Reprints and Translations.

DISCIPLINE:

ITS IMPORTANCE TO AN ARMED FORCE, AND THE BEST MEANS OF PROMOTING AND MAINTAINING IT.*

PRÉCIS BY LIEUTENANT E. M. LEWIS, U. S. A.,

ELEVENTH INFANTRY.

HAMLEY, in his "Operations of War," says: "Discipline is made up of a number of different qualities," and it is only by a proper appreciation of these qualities and a due knowledge of their action and reaction upon each other that a successful discipline can be obtained, and when maintained, can be kept up; for this, like every other moral or physical quality, can only be maintained in a flourishing condition by constant exercise, and it is one that is very prone to deteriorate unless carefully and judiciously watched and guarded.

Discipline has to do with the mental as well as the physical functions. On the one hand, it aims at overcoming fear, love of pleasure, indolence and recklessness, with the view of bringing the whole nature under control; while on the other it aims at guiding and directing the more noble emotions of enthusiasm, patriotism, and devotion to a leader; so that these, too, may be brought into harmony with the general whole; and, above all, it aims at inspiring a strong sense of duty, to become, as it were, a second and inalienable nature. The great aim and object of all discipline is not only to maintain order and to insure obedience and submission to authority, but also to produce and establish that cohesion between the individuals composing an army, which is essential if complete success is to be obtained in the operations in which it may happen to be engaged. In peace-time it underlies and forms the basis of the entire military fabric; and in war it is the invisible essence which, permeating an entire army, inspires it with the soul of the commander, and enables it to achieve great and glorious deeds. Such a sense of duty as is required is no plant of a spontaneous growth, but must be carefully cultivated and tended, and to this end the means of promoting and maintaining discipline must be directed. The practical method of producing and maintaining this quality in the most perfect degree is the problem to be solved.

* The pages that follow are largely a compilation from four English writers upon the same subject (Capt. F. Daniell, Capt. C. E. Telfer, Capt. F. G. Stone, and Capt. R. M. Murray, R. U. S. I. Journal, No. 148). Where passages have been used, the present author has had in view the selection of those which apply to the general case or to the special case of our Regular Army.

Habit is, as all the world knows, a very strong motive power, and one which has in itself an innate faculty of increase of strength and energy. Habits, bad or good, once formed by the repetition of certain acts, or even mental processes, gradually become a part of the life of the individual, and, finally, are almost unconsciously obeyed. Of what vast importance it is, then, that in the case of a soldier, care should be taken that the habits implanted in his nature in the ordinary every-day routine of his military life should be such as will increase his value when called upon to act in any, however humble a capacity, as one of a corporate body from which unanimity and uniformity are imperatively required. A soldier cannot and dare not, in many cases, stop to consider the why and wherefore of his action; the action must be instantaneous, and yet it must be adapted to its end; consequently he must be so trained that right thought and right action are practically one and the same thing.

It has to be borne in mind further that the requirements of the present day are something more than those of a past time, not so very many years distant. All that was ever demanded from a soldier is demanded still, and the development of military science makes yet further demands, but the progress of the age has also produced a class of soldier from whom more may justly be required. The private soldier of to-day is a very different sort of man from the private soldier of even thirty years ago; his mental qualifications are of a far higher order, he is better educated, has more respect for himself, and is altogether of a more independent character, by which is meant that he is more capable of acting alone, and far more capable of understanding the reasons why, under certain circumstances, he is required to act in certain ways. Thus the problem is complicated, for where "organic unity" is required, we cannot but recognize an increased individuality which has to be guided and controlled without being stifled.

And if this organic unity is needed for the ordinary routine of peace, it becomes ten-fold more necessary in the theatre of war, when such mighty issues depend upon the perfection of each smallest link in the chain. In peace-time, a laxity of discipline will cause inconvenience, annoyance, and a good deal of extra trouble to every one concerned; in war-time it will cause disaster and ruin. In the actual stress of battle, the all-absorbing struggle for life will keep men braced up to their task; but when the blood is warmed with no keen excitement, when the frame is wearied with long marches, and the mind with uncertainty as to what may happen; then it is that good discipline makes itself evident more than at any other time, and then must a leader feel that on the existence of it all depends.

Necessary as it is to preserve discipline during the fight, it is more necessary still in all those multifarious operations of war which culminate in the battle. When the bullets are actually whistling around them, there are many feelings which carry men on to their goal. In the excitement and tension of the nerves attendant on such moments, with some the innate savagery of human nature wakes up and overbalances other feelings, with others the positive knowledge that the forward path is the safer, all tend to make men go on; but when the din of battle is not raging, when each man has full consciousness of fatigue, hunger, and uncertainty, then there is no

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other feeling to keep him up but that stern sense of duty as duty, in other words, a sense of discipline.

Yet again there is another time when this is all-important, namely, in the moment of victory, and this for two reasons, firstly, a tactical one lest, when the cohesion of the attacking force has been lost, as inevitably it will be lost in the assault, and the reserves, perhaps, swallowed up to give weight to the decisive stroke, the enemy should be able, by a dexterous counterstroke from fresh troops, to turn the tide of battle and roll back the victors in confusion: secondly, a moral one, lest when the position is carried and the enemy is in retreat, the savage spirit which may have been roused in the attack should lead individuals to commit acts which in cooler moments they would shrink from, and which may stain the lustre of the country's arms. Those who have had experience of battle-fields will not be insensible to the importance of a very strict sense of discipline at this critical moment.

Marshal McMahon's retreat with his army after the battle of Woerth is given by General Hamley as a typical example of the conduct of undisciplined troops under such circumstances. Within a few days of the commencement of a campaign, two entire army corps were, for the time being, practically out of the question, so far as offering any resistance to an advancing invader was concerned. This example shows clearly enough the necessity of discipline during retreat, but the case may be further strengthened by an example which tells in the other way, namely, the wonderful manner in which the Grand Army in its retreat from Moscow, though beset by every conceivable disadvantage, effected the passage of the Beresina in the presence of the enemy.

In spite of the hardships and privations which this army had undergone, and the dispiriting sense of the failure of their enterprise under which they must have been laboring, there was that spirit alive in them which enabled them to perform this great feat of skill and endurance, which certainly could never have been carried to a successful issue had not their sense of discipline been strong enough to survive the shocks to which it had been exposed, and to make them remember that though misfortune had come heavily upon them they were soldiers still, and the conditions of duty were in nowise altered.

Having thus shown the truth of what was so nearly an axiom as to render further proof almost unnecessary—that discipline is important to an armed force, we come to a point to be dealt with which is one of the utmost importance, namely, Fire Discipline.

It is important to consider this, not only because on the field of battle it is of such overwhelming moment, but also it is one which unlike most of the other points which go to make up discipline, cannot well be perfected in peace-time, though no doubt a sound foundation can and ought to be laid, on which it will be safe to build in actual war; but since the result cannot be thoroughly and fairly judged, save by experience, we can never feel quite sure till we have tried, whether we have actually attained the object we wish for, so it is well to keep the problem constantly before our minds. Forewarned is forearmed, and if we are pre-

pared for a difficulty which is almost certain to arise, we shall be the better prepared to meet it when it actually comes.

While with infantry the question of controlling the fire on the battle-field is a most difficult one, as far as the artillery is concerned, it is much simpler. Even with breech-loading guns, the time taken between each round is necessarily long enough to enable the officers in charge of platoons to keep the fire well in hand, and also the longer ranges at which artillery will, as a rule, fight, makes the task of fire discipline comparatively easy. Even when, in the later stage of the action, artillery is pushed further on, still the nature of the arm is a salutary check, and also at that time extreme accuracy of fire is not so imperatively necessary; a case shot cannot well miss everything and everybody.

If the infantry firing could be confined to volleys, the problem would be in a great measure solved; but in open order fighting where parts of each organization become distended and even separated, this is impossible. In the battle of Woerth, for instance, the battalions launched to the attack, became gradually dissolved as they crossed the Sauer, and pushed across the low ground to the foot of the opposite hills, and there was indeed little opportunity for volley firing; battalions and companies were mixed up, little knots or groups pushed forward as they could, and no pause was practicable for a volley, even if an officer could have made his voice heard above the din to give the necessary orders.

The increased range of the rifle has made fire practicable at long ranges, and the more highly trained the men are in shooting, the more use can be made of this increased power of the arm, so at these stages volleys can be employed, and with well-disciplined troops will be most useful, but it is not at this stage that the real difficulty of fire discipline has begun. Even here it is very doubtful whether anything on a larger scale than a platoon volley can be attempted, but later on when the opposing troops have pushed closer to one another, and the action begins to wax warm, then it is that the real difficulty begins, for the control of the fire will pass into the hands of the sectional commanders, and these are the men above all others, the subalterns, sergeants and corporals, upon whom the question of fire discipline must be urged, and whom we must hammer away at till it has become a second nature to them to think of it.

In a book lately written, it is said with reference to a remark of General Skoboleff's that he could not urge too strongly on commanders to have the fire of their men under control, that this is to be done by so "regularly, consistently, and persistently putting the soldier through the action of firing by orders that it shall be a second nature to him to fire his rifle only under control of his superior, and not otherwise;" now, if this can be achieved the problem is solved, but the principle must not be pushed too far, so that the man will always wait for an order before firing, for this will not work in practice. It is all-important that the superior should thoroughly recognize his duty of controlling fire, but it will never do to lead the men to think that there will always be this superior to look to, in short, much must be left to the man himself, and it is in fitting him for this necessary contingency that the control exercised by the superior should be

directed. The above quoted author says in another place, "the voice counts for nothing during the greater part of the struggle," and if this be true, as it undoubtedly is, it is no good teaching men always to look for orders, for in the din of battle they will not hear them when given, even if there be a superior on the spot to give them.

This question, more than any other, is now engaging the attention of soldiers, and it is pretty generally admitted on all sides that the army which has the best fire discipline will be the victorious army of the future. The experience of the Germans in 1870 amply showed the necessity of fire discipline, and with their accustomed steady perseverance and energetic use of the opportunity afforded by peace, they have diligently set this problem before themselves, and will, no doubt, effect a practical solution of this, as they have of so many other difficulties of military training.

Just how much the problem will be simplified by the introduction of the smokeless and almost noiseless powder adopted by France and Germany remains to be seen. The diminution in the noise made by the discharge of fire-arms will certainly enable captains to make themselves heard further, but the absence of smoke in firing will to a certain degree prevent his detecting those men in his command who are wasting their ammunition.

It has been said that the simplification of drill will shorten the necessary period of enlistment, but this is far from being the case ; the training of the soldier will take just as long as before, for the end to be gained is one harder of attainment, and the means adopted must be even more energetic.

It is impossible to lay down any hard and fast rules, but it seems that what is wanted is to begin at the very root, and employ the time allotted to training in impressing upon every single man, but above all upon officers, and non-commissioned officers, the value of fire, the way in which this value is multiplied tenfold by a cool and thinking use of it, and the importance of not just letting off a rifle, but of shooting so as to hit and kill.

Every captain must pay more and more attention to each individual man of his company ; at drill, on the target range, and in the lecture-room, he must impress upon every man, and urge upon his subalterns and non-commissioned officers this question of fire discipline.

We still seem to have some lingering notion that a soldier, like a poet, is born and not made, but, as a matter of fact, probably for every one born soldier a thousand are made, and made by a persistent and lengthy process ; the knowledge of war does not come by nature, it must be learned like everything else, and we want to realize that point. "Will, study, and perseverance," said Napoleon, "have made me what I am."

Practically, then, let each captain try to realize the problem himself, and to impress it upon his men. "Constant dropping wears away the stone," and we shall not get what we want by a miracle, or by any sudden inspiration on the part of ourselves or our men ; it will only be by a constant endeavor to implant the fact that a good soldier must have a cool head, a steady hand and a deliberate aim at some special object. The real gravity

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of the situation should be laid before the men ; it is a serious thing to go with your life in your hand to meet probable death with a cheerful face and stout heart, but they will not find it any the easier because they have not realized the situation till they are actually face to face with it ; so it is just as well to put it plainly before them that there is difficulty, and there is danger, but that the spirit of duty, that is discipline, has to be raised and strengthened that the difficulty may be faced, the danger braved, and the object gained.

Now to apply what has been said to the case of the actual attack with a view to obtaining the necessary fire discipline. It must be presumed that no regiment will take the field without having undergone some such system of personal and individual instruction as has been indicated above, and there is one leading feature which must not be lost sight of, namely, that the commander of a battalion cannot be everywhere and do everything; he has his own proper sphere of action, and he cannot take the place of his majors, captains and subalterns. It is no good his attempting to do so, and such an attempt will only lead to confusion; he must be content to let each individual officer carry out his individual part of the battle.

Of late years, with improved and improving fire-arms, the different stages of a battle are not at all what they were, the effect of fire begins at a much greater range than formerly, and this is so far in our favor. In this early stage fire discipline may be rigid, for the men are still kept together, the noise is not too deafening, and the excitement of battle has not yet reached fever heat, so volleys are admissible, possible, and effective. Even here though these volleys will at most be only company or half company volleys, so at this stage the fight is beginning to be worked out by the company officers. Then as the advance progresses, as bullets fall thick and fast, and many a gap appears in the ranks, excitement increases, the men want to fire rapidly, no matter whether they can see anything definite to fire at or not, and at once the officers have a harder task, but still a good deal of control can be exercised if the officers and men are accustomed to one another, and the tendency to fire wild must and can be checked. This will be all the easier if each man has had thoroughly impressed upon him that every shot which does not disable an enemy is not only wasted but actually adds to the risk of the man firing, by depriving him of ammunition which he will stand in urgent need of later on.

Then comes the other stage when the action is at its hottest, when the opposing troops are well in view, and then is the hardest task of all, a task, too, which will fall in a great measure on sectional leaders, and whenever an officer or non-commissioned officer can then gather a group near him which can see him and look to him for guidance, he will exercise a very important influence on the fight ; he may not be able to get a volley fired, but if he and the men have been well trained he will be able to exercise a salutary check upon their firing, and prevent waste of ammunition with its attendant risks. He will be able to insure fire being delivered when and where it will be effective ; in fact, if each sectional leader will keep his head and use it, he can do much in the way of control, and probably this is all he can be expected to do.

To sum up, fire discipline means decentralization of authority. Each

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rank has quite enough to do if it does what is required of it, and the commander cannot do the captain's work nor the captain the subaltern's, and so on to the last link of the chain. Decentralize authority, educate individuals in peace with the greatest care that they may know their duty, and in action let them do it.

The next point to be considered is discipline mainly from an administrative point of view. Although, of course, the object of all discipline is tactical efficiency, yet the various parts of the machinery employed in training troops in peace, which are not immediately and directly connected with their tactical handling in the field, can be included under this general heading of discipline for administrative purposes. Here, as first in importance, as well as underlying very nearly every aspect of the subject, will be first considered the giving of orders.

Now if we want to get discipline, the relation between giving an order and the carrying out of that order should be so close that practically they are one and the same thing. A superior must not be disobeyed; immediate and cheerful compliance is essential, and an officer's duty does not end with giving an order; as one who is responsible for the proper training of his men he must go a step further, and see that the order is complied with. This rests entirely with the officer himself and the manner in which he gives his order has a very great deal to do with it.

In our Army, it is hardly necessary to urge upon the officers the duty of courtesy toward the men, for it is to be found to a very marked degree, but it is important to see that it is not forgotten by non-commissioned officers. "Manly rank is a credit to any soldier, but a domineering parade of rank is only a display of ignorance and imbecility." Officers are fortunate if they get sergeants and corporals who will actually carry out in their dealings with the men principles such as these; the discipline of a company or of a battalion becomes tenfold easier, and a feeling of comfort pervades all ranks. But to attain this they must treat non-commissioned officers in the same way, for the behavior of the latter to the men is a reflex of the behavior of the officers to themselves, only with any mistakes exaggerated, and for the object we want, namely, a prompt obedience of orders, mutual respect is necessary.

The Army, of course, contains within its ranks, a number of very different natures, and there are many officers who seem to be able to get what they want done by the men with very little difficulty, while others never seem quite to succeed in establishing what the Duke of Wellington spoke of as "the mutual confidence between officers and men." With every wish to maintain a strict but not a harsh discipline, they somehow cannot quite manage it, and the force of circumstances drives them into difficult situations, whence they cannot well escape without seeming harshness or undue laxity. We are inclined to think that the quality of being able to deal with men is a natural gift, and we envy the possessors, but while it is in part natural, it is not altogether so.

In dealing with men, it is the firm and steady hand which helps discipline; and if an officer has not got this quality by nature, he will have in the ordinary course of his profession every opportunity of acquiring it, if he

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wishes to do so. Natural indolence, natural irritability or impatience can be overcome, and unless an officer does succeed in overcoming these things he will never get his orders obeyed in an emergency.

Command is just as much a duty as obedience, and it has been well said that the faculty for so giving an order as to leave the impression that it is as much the duty of him who gives the order to give it as of him who receives it to obey it, is a most valuable one to cultivate. Firstly, then, in giving an order he who gives it must be convinced that it is his duty to do so; unnecessary worrying orders are fatal to discipline, men get fretted by little trivialities being made into matters of importance, and of course, however trivial the order of a superior may seem to be, it must be obeyed.

An order should be indisputably necessary, but when an order has been issued by superior authority, however unreasonable or faulty it may appear, it is the duty of all officers to loyally carry it out; there must be no questioning or grumbling. Let every officer in such a case remember that he is doing something more than carrying out an order of which he disapproves, he is setting an example of discipline. Hesitation in obeying orders, or an ill-grace in carrying them out on the part of an officer, will sow the seeds of indiscipline among the men, seeds which, under the influence of hardship and danger, will bring forth their fruit all too soon, and spread with frightful rapidity through an army.

Next in importance, the order should be very definite. According to Van Hardegg, "an order is short when it does not contain one word too much, complete when there is not a syllable wanting:" prolixity is above everything to be avoided, it creates a confused impression on the mind of the recipient, and where we want right action to follow right reasoning the idea conveyed to the mind of one who receives an order must be a clear impression of the idea in the mind of the superior who gives it.

There is another point of importance, and that is that every one who gives an order should thoroughly realize in his own mind what will be the result ensuing from it. Sometimes orders are given which in themselves are perfectly legitimate and right, but which cause an inconceivable amount of friction and discontent because they are either given at the wrong time, or they are of a nature to thoroughly upset a number of collateral things, of which probably the officer who gave the order had not the slightest idea.

Fussiness should be carefully avoided, for however well meant, it is death to discipline. Soldiers are not children, and they get irritated by fussiness, even if the object be their own comfort and advantage, but definiteness of purpose will go a long way with them.

Punishment is a necessary though disagreeable means for the enforcing of discipline, though "discipline enforced by punishment alone is a poor sort of discipline which would not stand any severe strain."

What must be aimed at is that high state of discipline which springs from a military system administered with impartiality and judgment, so as to induce in all ranks a feeling of duty, and the assurance that while no offense will be passed over, no offender will be unjustly dealt with. This expresses the three main points to be observed and the object to be gained,

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namely, impartiality, judgment, and an unbroken sequence between cause and effect tending to produce in all ranks a feeling of duty.

Now, there is nothing which tends more to preserve discipline than the knowledge among the men that they will not escape the consequences of their acts; that there will be no weak "letting off" on the part of their officers, but that so surely as they break the rules laid down for them, they will be called to a reckoning, and have to take their punishment. Of course, there are some cases where men will deliberately go and commit some military crime with the full knowledge that they will have to take the consequences; and with no attempt at concealment, they simply do as they choose, and then brazen it out. But these are not the ordinary cases, and when once a man understands that there is no element of chance about the matter, but that punishment follows crime as a matter of course, he will be a good deal more careful how he conducts himself. Very few people, officers or others, take any pleasure in dealing out punishment, and young officers especially are inclined to obey the natural promptings of, perhaps, an easy-going disposition, and to let men off. But this is really the greatest possible mistake; it is not a high sense of duty, and is no real kindness, and the sooner every officer realizes that the question is not one of individual inclination, but just simply a matter of duty, the better it will be for them and their men, and the more a right and sound discipline will flourish.

This does not apply to first offenses. In all cases, let mild reproof and admonition be first tried, but when these are found useless, and punishment has to be resorted to, let there be no weak holding back, but let every officer, of whatever age and length of service, do his duty.

For young officers this is often very hard, and by a good many mistakes they gradually learn how to carry out their duties in this matter: the offender is often, in more senses than one, a much older soldier than his superior, and he tries to see how far he can go. Some mistakes will inevitably be made, but it is just as well to bear in mind that while these mistakes are being made, which perhaps no one ever hears of, or knows save by their results, the cause of discipline is decidedly suffering.

Then there must be some logical proportion between the breaking of the law, and the consequent penalties, and these penalties must be in all main features, the same under similar circumstances. The Articles of War permit courts-martial to award for most offenses, punishments that are limited only by the death penalty. To this freedom are to be attributed many cases of apparent injustice, as that, for instance, recently quoted, in which two soldiers deserted on the same day from the same post, and surrendered themselves or were apprehended on the same day. They were tried by different courts-martial, and one received eighteen months' confinement and the other five years. There seems to be in our Army a growing desire for a penal code which will designate the proper amount of punishment (within certain narrow limits) for various military crimes. A revision of the Articles of War was recently recommended in several of the annual reports.

Aside from the apparent injustice of many varying sentences of courts-martial for the same offense, the fact that such variation may exist is detri-

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mental to discipline. When men begin to see that similar offenses meet on different occasions with unequal punishments, at once they know that the element of chance has been brought in, it may be their fortune to come in for a light sentence, or their ill-luck to come in for a heavy one, and as has been said before, this element of chance is one which is very hurtful to discipline. It is far better that a man should know positively that he will undergo a punishment of severity proportionate to his offense than that he should feel uncertain whether he will, on the one hand, be very severely dealt with, or on the other, get off very lightly; and this feeling of certainty will promote discipline as much as the opposite feeling injures it.

Corporal punishment in the Army is forbidden by law, and yet General Upton says:

"During the American Rebellion there was scarcely a regiment in which corporal punishment in some form was not *daily* administered, and this arose from no desire to violate the law, but from a necessity to which many representatives in Congress can testify. Even the expedient of the Field Officer's court-martial failed in its object, for when troops were on marches there was no time to take evidence and make out proceedings. When, therefore, stragglers and marauders returned to their regiments, the colonels adopted the sure and expeditious process of pronouncing a punishment, which, being brief in its character, allowed the offender to be restored speedily to duty," a strong argument, apparently, in favor of flogging; but did the punishment effect its object, viz., the re-establishment of discipline and the *prevention* of further crime? Evidently not, for the punishment was *daily* inflicted! Would not the punishment of death, inflicted in the first case of desertion, marauding, or insubordination, have served as an example which would have obviated the necessity for flogging, by deterring would-be evildoers in the future from incurring a like penalty?

It has been said that the worst use to which a man can be put is to hang him; this may be extended with regard to a soldier to the question of imprisonment, considering him as an individual supported by the State for the performance of certain definite duties, and trained for those duties at a considerable amount of trouble and expense. It is probably about the worst use we can put him to, to imprison him. As long as he is in prison he is an unproductive factor in the Army, he is doing no good, and is still costing money to the country, and when he comes out, there is every prospect of his being a worse soldier than when he went in. Unfortunately, imprisonment is in many cases a necessity, but if the principle is recognized, as it is decidedly being recognized now, that it is a makeshift sort of expedient at the best, it will be well in the interests of discipline, as well as in those of economy, to miminize imprisonment as much as possible.

In the class from which soldiers are drawn, the stigma of going to prison is a very deep and real one, and it is a class which is not prone to appreciate subtle points of reasoning as to the cause for which the imprisonment is awarded, or the nature of the crime which has brought about this punishment. Going to prison simply means to them just what the words convey; they feel the disgrace of it very keenly, and when a soldier for the first time comes out of the guard-house he feels himself lowered in the eyes of

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society, so that it is difficult for him to make a fresh start, and right himself in the opinion of his world.

From every point of view, long terms of imprisonment without discharge are not likely to do much good; if they are intended to impress upon the offender the sense of his wrong-doing, a shorter term will effect this equally well, and certainly it is not for the good of the State that a soldier should be kept eating the bread of idleness—so far as military duty is concerned—for a longer period than can be avoided, even if the bread be only prison fare. In cases where the gravity of the crime makes a long sentence necessary, it is better in the interests of discipline that it should be coupled with discharge, for the soldier, unless a very exceptional sort of man, is not likely to be of much good afterwards.

Dishonorable discharge is a very powerful weapon in the hands of courts-martial, and now that evidence of previous convictions is admitted, it can be more generally used. It is very evident that recent legislation and changes in the Regulations have in view the improving of the condition of the soldier. We want to have better men under the colors than we have had previously, and we hope to get them. In the wide field, however, from which we draw our recruits, we get hold of some very doubtful characters, and they are nothing but a nuisance when we have got them, they keep up the crime average, both by their own acts and by the example they set to otherwise well-disposed men, and they are not worth keeping. Yet somehow or other, we are very long suffering before we finally get rid of them, and in the meantime they are a plague spot. Is this because we are so put to it for men that we can't afford to lose these black sheep? Surely not! Recruiting is active, and in a flourishing condition, and we can get soldiers if we want them, whereas the existence of these bad characters in the ranks tends to give soldiering a bad name, and to stop decent recruits from enlisting.

The prejudice against the Army that used to exist in the classes from which our soldiers are drawn is slowly dying away, but it has not gone yet. Officers are constantly finding that men in the ranks are going under their "soldier names," because they are ashamed to have their friends know that they are wearing a uniform of which they ought to feel proud.

Now, if the thoroughly low and bad stamp of man be ruthlessly weeded out of the Army, the lads who go back to their homes on furlough will be all the more inclined to attract others by their story of military life, and we shall gain both in the number and the quality of recruits; while if the public in general find that the village blackguard is not good enough, nor nearly good enough for a soldier, but that we will not keep him, their ideas about the Army, already, as has been said, improving, will improve still more. If we can reform the ne'er-do-weel—and we very often do, and make him a respectable member of society—all well and good, and the country gains a man, but why keep him to be a thorn in everybody's side, a useless mouth to feed, and an evil influence among his comrades?

The objection is often raised that by discharging a man the authorities simply do for him exactly what he would wish, that having found the Service is not such a good place for a worthless character as he fancied it would

be, all he wants is to get out of it. This is true, but if we go to the real root of the matter it is doubtful whether this objection will prove quite a sound and reasonable one. The object we aim at is to get good and trustworthy soldiers, not to use the mechanism of the military machine in making life unpleasant to a bad character who steadily declines to be reformed; if the man is kept in the Service he learns certainly that rules cannot be broken with impunity, and in many cases he passes a large proportion of his time under punishment, but the question is, does the country and the Army gain anything by this? Public money is spent, but is there any adequate return for it; is the general good advanced by the unavailing attempt to make a soldier out of such very unpromising material; would it not be better, even at the risk of falling in with the wishes of the offender, to let him see plainly that the Army does not want him, and will not have him, and to send him about his business summarily? Any satisfaction that he may derive from this can be considerably minimized if he has brought himself into the position of a prisoner before a court-martial, by a sharp and severe sentence of discharge followed by imprisonment.

If this measure were a little more fully used, every one in a regiment would be saved a great deal of trouble, and the cause of discipline would certainly profit. The ranks of our Army can be filled with decent men who will make good soldiers; what, therefore, is the use of keeping those who simply go on from one crime to another and are always being punished, even if their offenses are of only minor degree? Let them go, and the Service is well rid of them.

The question of obtaining good and reliable non-commissioned officers is one that has a material bearing upon the discipline of the Army. What company commander is there who has not, at some time or another, found himself in the awkward dilemma of either disregarding a non-commissioned officer's story or punishing a man, perhaps unjustly? To let a non-commissioned officer feel, and to let the men see, that he is not trusted, is fatal to discipline, while to let any man have grounds for thinking that he is unfairly dealt with is equally fatal. If any officer be in the position of having non-commissioned officers under him who are not perfectly trustworthy, he is likely often to find himself in a very uncomfortable predicament, which it will need all his tact and experience to come safely out of without prejudice to discipline. There is no royal road out of this difficulty; neither officers nor non-commissioned officers can by any magic process be rendered immaculate specimens of perfect tact and temper and of unerring judgment, but a difficulty fairly looked at and understood, is in a fair way of being overcome by energy and determination.

The question is again simply one of training, a slow and gradual process, but, like many other gradual processes, an effective one. To make a very young soldier a non-commissioned officer, however smart he may be, and however capable of repeating pages of the drill-book, is simply to court complications of this kind. Before any man is allowed to wear a stripe, he should be a proved man, and one who has thoroughly learnt the duty of disciplining himself before he attempts to exercise any function of command over others. There are plenty of men who have nearly every good

quality which a soldier should have—men whom every one in the regiment would like to see in the non-commissioned ranks—but they have not got just that tact and temper which are needed, and, hard as it may seem, they should never be promoted, at any rate till they have remedied this defect, and this both in the interests of discipline and of themselves.

Again, some non-commissioned officers do very well on the drill-ground or under the supervision of a superior, but make dismal failures when sent in command of a body on detached service. In our Army, the non-commissioned officers are practically chosen by the captains, whose duty it is to see that they are properly trained. He should select only such men as he feels that he can trust, and he should let them see that he does trust them fully, and that any betrayal of such trust will meet with severe and prompt measures.

Food is another important factor in the discipline of troops.

Discipline aims at the perfection of the human machine; health is one of the primary necessities for this perfection, and food is inseparably connected with health.

It is a matter of common and everyday experience that a man's temper is very much dependent upon the state of his stomach, and it has passed almost into a proverb that things assume a brighter aspect after a good dinner.

Human nature is the same in soldiers as in other people, and a man who is turned out of bed on a cold morning and marched off to "early stables" on an empty stomach is not in a state of mind or body which is conducive to his keeping himself well within the bounds of discipline if anything occurs to ruffle him, and this is especially the case with recruits, who not only usually have larger appetites, and so feel the effect of an empty stomach more keenly, but also, in their early days in the Service have morning squad drills which hardly the greatest enthusiast could call especially interesting, the continuance of the second exercise and balance step being somewhat trying even to the best temper.

Exact science, with calculations of heat value and work value, says that the soldier's food is sufficient, but then exact science cannot by its nature duly take into account the ever varying personal factors of the equation. What is sufficient for the old soldier, with all his muscles set and his bodily frame fully developed, is by no means necessarily enough for the hungry young recruit, who is daily adding to his supply of bone and muscle, and who also is doing work of a kind to which he has been utterly unaccustomed, and which demands bodily exertions of a kind very different from those required by his former avocation, whatever it may have been, but all necessary in the process of "setting him up" as a soldier.

The cause for general drunkenness in a company has more than once been traced to a lack in quantity, quality or proper preparation of the food supply. A natural but ungratified appetite for wholesome food develops into an unnatural appetite for stimulants.

Some captains especially pride themselves upon the fare of their men, and it would conduce to the comfort of soldiers throughout the Army if more company commanders would make the kitchen a matter of study and

more careful personal supervision. That the ration should be increased by the addition of at least potatoes and onions is now generally acknowledged by all, but those in whose power it lies to make the change.

If the cause of discipline can be at all advanced by a little common sense attention to the matter of food, it is well worth while devoting this attention to it, for a young soldier before he has thoroughly learnt the lesson of discipline will have plenty of temptation to break through its rules without having the additional one of an empty or only half-filled stomach to add to them.

Canteens, gymnasiums, club-rooms and the like act beneficially for discipline. All that tends to make men contented, tends to keep them within bounds, and such sources of comfort and pleasure as the above form additional inducements for good men to enter the Service.

The best means of promoting and maintaining discipline can hardly be considered to have been fully dealt with without some mention having been made of the subject of combined manœuvres, considering them in the light of their value from a disciplinary rather than from a tactical point of view, the latter being beyond the scope of this essay.

It is a fact that no thinking man will deny that our Army sees too little of this kind of work. In barrack or permanent post the routine goes on steadily, and every one gets to know his duty and place so well that no very great effort is needed to keep things going, but when men cut loose from familiar duties and surroundings, all is different; it causes a general shake-up, so to speak, of all ranks, and throws every one more upon his own resources, which is a very desirable thing, for commanding officers can then better gauge the value of the officers, non-commissioned officers and men under them. It does away with a mechanical way of going on, and is beneficial to everybody; weak points and strong ones will appear which have hitherto perhaps escaped observation, and it is better that we should discover our weak points before we actually take the field in war, when it may be too late to remedy them.

Competition and emulation between different organizations and different arms would prove beneficial both to officers and men, and *esprit de corps* would be fostered and increased.

The attainment of discipline is a long and sometimes an uphill task; like most other things it is only done by slow degrees, and success is only to be achieved by persevering efforts which never lose sight of the goal, but steadily inch by inch fight their way towards it.

The question is one of combined moral and physical qualities, and must be considered in all its complex relations by those who would discipline the men under them. No incident of military life is too small to exercise its influence upon the result, no incident is so important that it alone can do the work; the whole process is that of some great and complicated machine the effect of which is clearly evident, but to the production of which effect the perfect adjustment of the minutest cog, of the most delicate and almost imperceptible spring, is necessary.

The end before us is a noble one, the means are surely therefore worthy of our earnest attention. Soldiering is now no holiday pastime, it is not

and can never be an occupation to fill up odd moments, and to be taken up as a sort of semblance of employment, it must be the real hard and earnest work of a life.

Just in proportion as every one feels this, so will a perfect discipline be easier of attainment.

The conclusion then is that we should first try to realize the conditions of the problem, and train *ourselves* to a high state of discipline, and then set to work in every action of our life as soldiers to apply these conditions. Whether it be in the giving of a simple order, the confining of a prisoner, the inspection of a barrack-room, or in any other circumstances whatever, we should look to the end, and endeavor with all our might to be thorough and whole-hearted in striving for this end.

LETTERS ON ARTILLERY.

By PRINCE KRAFT ZU HOHENLOHE INGELFINGEN,

Translated by Major W. L. Haskin, U. S. A.

X.

HOW THE ARTILLERY SAVED ITSELF IN THE LAST WAR.

THERE remains to be examined one point in regard to which the artillery appears under a much better light in 1870–71 than in 1866.

In 1866 a number of pieces withdrew from the firing line either to refit or to evade the fire of the enemy's infantry, while in 1870 this has not occurred.

Whenever it happened in 1866 the fault was due to the regulations which had been elaborated during the long period of peace, or to customs which had acquired the force of law. Neither the one nor the other was based upon experience acquired in actual warfare.

Recall to mind that part of the regulations devoted to the exercises called "mechanical manœuvres and repairs," the greater part of which had no other aim than to "save" the pieces.

The chief one of these manœuvres, that one in which the men were all first exercised, was the placing of a trailing-beam under the axle of the piece to take the place of a disabled wheel. How much importance was attached to having the different lashings made with the greatest care! But in what could this be employed if not in carrying the piece from the field, that is, in retreating with it. It is true that the men were told that the piece thus sustained could be fired, and to prove this a blank cartridge was fired from a piece so supported. But when a piece was once fired with projectile during the course of one of the firings "for instruction and study," the recoil broke the support as though it had been a toothpick, to the great amazement of the corps of officers who certainly had their instruction in this respect well and fully completed on that occasion.

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Where is this beam or pole to be obtained just when it is wanted? The regulations reply to this question by requiring that a tree in the vicinity should be cut down and trimmed to the required form. But it is perfectly plain that this carpenter-work will take more time than would be required to obtain a spare wheel from the repair wagon. Yet the employment of the trailing-beam remained none the less the favorite mechanical manœuvre.

There was also the manœuvre which consisted in suspending the piece under the limber; another manœuvre which had no other aim than to "save" the piece—to carry it to the rear when an opportunity offered. But, in the four campaigns of 1864, 1866, 1870 and 1871, I never saw the trailing-beam used nor a piece suspended from a limber. I will go even farther and assert that no officer has put in practice either the one or the other of these manœuvres during either of these campaigns.

The regulations certainly required that all these mechanical manœuvres and repairs should be executed in the line of fire "if it be possible," but it also required that the pieces which could not be repaired in the firing line should be taken to the rear to be repaired outside of the dangerous zone of the enemy's fire. This dangerous space has been considerably extended by the invention of the rifled piece, and a disabled piece may now have to go 4,000 yards to the rear. If a captain were to send a single piece this distance to the rear under the charge of a non-commissioned officer he could hardly expect to see it return. It is very difficult to know whether it is going to be possible to proceed with the repairs while still under fire since that depends upon the severity of this fire during the time required to make the repairs, and it cannot be known in advance whether it is going to be violent or not.

Whenever, therefore, a single piece, or several pieces in a battery, needed repairs, the battery commander could withdraw the entire battery from the line "in order to refit" without contravening the regulations in any way.

It was considered a very great dishonor to lose a piece. Ever since the War of Liberation it had been the custom to exercise great severity in this respect. When Bernadotte hesitated to comply with the reiterated requests made to him by Blücher to come to take part in the battle of Leipzig—because the movement seemed to him to be too hazardous, he said emphatically that he had taken part in such and so many battles without ever losing a piece.

It is right and proper that the cannoneer should prefer to die under his piece rather than to lose it, for upon the piece is engraved the eagle, and with the hand upon the piece he takes his oath of allegiance. For him the piece is the flag. Yet it is better to lose a piece than a battle.

Wholly different principles were established in regard to this matter after the War of 1866. In 1870 and 1871 we lost pieces in action just as we lost flags, but how great the glory these lost pieces conferred upon the troops who were forced to abandon them to the enemy! The circumstances attending these losses constitute some of the most glorious deeds of our military history. The principle had finally been established that the loss of a piece did not necessarily constitute a disgrace, simply because of

the loss; but that the important thing to be considered was the manner in which the troops had conducted themselves at the time.

After the War of 1866 the principle was established that no piece, no matter what its condition, should be withdrawn from the firing line. This is why all the pieces in the war which followed remained in position and were repaired there with the aid of spare parts taken from the repair wagon which was posted within reach with the first echelon of caissons.

Experience had shown the necessity of formulating this principle, for the temptation to obey the semblance of a necessity was perhaps too great for many a battery commander, leading him to quit the field under cover of the requirements of the regulations. A praiseworthy desire to preserve all his pieces might even have led to this determination.

I have heretofore had occasion to remark that the instinct of self-preservation inherent in human nature never manifests itself directly with persons of high and noble nature, but that to exert its influence upon the actions of such persons, it makes use of some plausible pretext and by its assistance slowly works its will. From the moment this pretext ceases to exist the instinct is silenced, for all such individuals desire above all things to do their duty. The necessity for repairs to the pieces, the failure of ammunition, exposure to the fire of the enemy's infantry (this last point I shall speak of later), all these were such pretexts and were all in some sort justifiable. But it is very difficult to determine at what moment the instinct which hides itself behind the pretext speaks to the heart of the man. That depends absolutely upon his nerves and the amount of resistance they are capable of offering.

The manner and actions of many of the men who first came under fire impressed me very much as do those of a party which bathes in a cold river on a very warm day. It is with the greatest pleasure that they throw themselves into the water. At first the coolness causes a delicious feeling, but after a time some of them begin to shiver and desire to go out; others are seized with this desire a little later, and it does not come to others for quite a long time. It is necessary to have strong nerves and the habit of bathing to feel at ease in the water for long periods. In every case the company is more gay when dressing themselves than when they were in the water.

The nerves of our officers were absolutely the same in 1870 as in 1866, but the requirements of the regulations had been changed. The first principle was that no line of artillery, that no piece, should retire without having received the order to do so. It is for this reason that I never, in the whole course of the War of 1870, saw any artillery withdraw from the line for repairs. There were a certain number of pieces dismounted. At St. Privat, as I have already said, there were three pieces in all the batteries placed under my orders which were unable to advance when we moved forward to sustain the infantry attack. Of course, they remained in their places. They were repaired there, and as soon as possible they rejoined us in our new position. At Sedan one of my pieces was totally disabled—the piece had burst. But it nevertheless remained on the firing line. I believe that with the other corps in 1870 it was extremely rare for an artillery line or a piece to retire without having received orders to do so.

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Prior to 1866, there existed in the regulations evolutions which had no other object than to teach the men to run away from the enemy. This is a hard thing to say, but I find no better way of describing them. Furthermore, these were the very evolutions which were practised from choice and in which the men were exercised again and again, for when they were well executed they made a very beautiful display.

How can that manœuvre be anything other than a flight which consisted in making a horse battery retire at a trot at the instant when the lunettes of the carriages were caught upon the pintle hooks of the limbers and before the cannoneers could possibly get into their saddles, the captain afterward leading them after the pieces at a gallop. Did you ever see a horse battery at drill (before 1866) that did not execute this manœuvre? It was certainly an exciting spectacle to see the horsemen mounting with marvelous skill and agility and following their pieces at the top of their speed. But suppose the slightest fault to be committed in the execution of this evolution when in the presence of the enemy. Suppose simply that the captain fails to see that his sixth piece has not had time to limber up, and that he orders the trot too soon. What happens? Five pieces and a limber start off at a trot; the cannoneers mount and follow; the projectiles sent after them by the enemy cause the draught horses to accelerate their speed; their trot becomes a gallop, then a run. It is in vain the captain tries to overtake the limber which has deserted its piece. The horses which draw it go as fast as his own. The noise of the wheels drowns his voice and his trumpet signals. The gait of the captain, who goes at his greatest speed to overtake the limber, seems to his men but a proof that he is content to see them retire at such great speed, and so the whole mass retrogrades at a triple gallop and traverses perhaps a German mile before some obstacle brings it to a stop. To crown his misfortune it might happen that the cavalry with which he had originally advanced might bring his lost piece to the rear by the aid of lariats before his orders to return for it could be executed. It would only remain for him to blush with shame while he thanked them for their kindness in returning to him his prodigal child.

I do not know whether such a thing happened in 1866; I believe not; but this I do know, that after that campaign the rule was placed in the regulations that if the artillery receives orders to retire it shall do so only at a walk, and that a more rapid gait can be allowed only in exceptional cases, such as when the battery finds itself within the field of fire of an artillery line which has opened from a position farther to the rear,—a line upon which it also must proceed to post itself. In all cases, *artillery retiring must never traverse the first hundred paces after limbering up at any other gait than a walk.*

The new regulations contain this same provision, and in this way the practice of teaching the horse batteries how to run away from the enemy was made at one blow to disappear from the field of manœuvres. In the interval between 1866 and 1870, it was never seen.

There was another still more showy method of performing rapid retrograde movements prescribed by the regulations, which consisted in causing the mounted detachments of the horse artillery to make an attack upon the

enemy in open order, while their pieces were retiring to occupy a new position in rear.

I acknowledge that when I was a lieutenant I always greatly enjoyed making one of these attacks. When it had been made the trumpets sounded the recall or rally, and the horsemen came tearing back at full speed over the space they had traversed in charging and back to the new position, a distance sometimes of 1,500 paces. The field of manœuvre was covered with these horsemen riding furiously. They had to require of their horses all the speed of which they were capable in order to reach the battery and unmask its front before the first piece, loaded by the drivers of the swing teams, was fired; and all the civil and military spectators gave free expression to their admiration of the magnificent spectacle they had witnessed. My heart beat rapidly and I was excited by the rapid movements and flattered by the approbation of comrades, until I almost believed that I had taken part in an heroic action, for this movement was in some sort the crowning display of the preparatory artillery exercises. I did not consider that such an attack upon the enemy was wholly impracticable, and that even if it were practicable it would be an error to make it, and that there was nothing to be proud of in having run away, for this crowning event of our evolutions represented nothing else but a flight.

Perhaps you do not agree with me in my view of this evolution, but think it really practicable, and do not acknowledge that it would be wrong to make it. Think a little! At what distance from us must we suppose the enemy to be when it is proper to make this attack? A hundred paces? Then he will rout the cannoneers and will follow the pieces pell-mell with them and will overtake them, for they cannot have gone far. Let us say 400 paces or more. In that case I make my retrograde movement with all my cannoneers,—I make no attack,—the enemy does not overtake me. I shall not have sacrificed half my men and thus weakened the efficiency of my battery. You certainly cannot suppose that the charge will be a successful one. If the enemy were so few in number that the 48 cannoneers of the battery, acting as cavalry, can rout them, one salvo of canister well directed and fired at 200 paces will reduce their number to such an extent that the survivors, even if they reach the battery, will no longer be strong enough to capture it.

There are those who think that the cannoneers of a horse battery should join a cavalry charging line as a reinforcement to it. To my mind it would be just as proper for a battalion commander attacking a village to cause the platoon of cavalry attached to his force to dismount and fight on foot as a reinforcement to his skirmish line. It is true that this has been done, but only at Kriegspiel and by a lieutenant fresh from the corps of cadets.

Under any circumstances that you can imagine, the battery will do ten times as much execution by its fire as by an attack executed by its cannoneers, and they will check the enemy much more certainly by its fire than by one of these attacks, provided the men remain steady and aim with coolness. It is, therefore, much better to continue firing than to make one of these attacks, and to make one will be a blunder.

The rule that artillery in retiring should never traverse the first hundred

paces faster than at a walk caused this manœuvre also to disappear in the interval between 1866 and 1870.

Horse artillery being now armed with rifled pieces and infantry with long range arms, it is my belief that none of these attacks by the cannoneers of a battery can take place in future.

These evolutions appear to have had their origin in a single event which occurred in the War of Liberation.

It so happened that a horse battery which had opened fire was attacked on its flank by a small body of the enemy's skirmishers. Although the range of the smooth-bore musket was very limited these men succeeded in reaching the battery with their bullets, and according to the ideas then prevalent, this was a case in which the battery should have withdrawn. But this captain was made of different stuff. He mounted a part of his cannoneers and routed the enemy's skirmishers with them. This action brought great credit upon him and and it was but just that it should. Later he became chief of staff of the artillery (General von Jenichen) and finally he was named one of the inspectors of artillery. In fact he was one of the most highly esteemed generals of his time. His ideas had the force of law, and his brilliant deeds served as examples to the artillery. The cavalry attack executed by horse artillery was therefore introduced under the most varied different forms. As a matter of course they were never omitted when the celebrated Jenichen was the inspector.

An occurrence of this kind could not again take place, for skirmishers annoy us now at a thousand paces, and certainly you would not send cannoneers to that distance. The fire of the battery is much more effective than the few sabres of the cannoneers, and at the present time ten sharpshooters would suffice to repulse fifty cannoneers who were to execute an attack of this kind.

In order that the batteries should be in condition to render the maximum of service, it would be advisable, from an artillery point of view, that the cannoneer should have no other arm than his piece, that he should concentrate all his activity upon the service of the piece, and should see in it his sole means of safety.

I could name to you an artillery officer of high rank (if he had authorized me to use his name) who rode among the batteries with the greatest coolness, playing meanwhile with a riding whip which he carried because his horse sometimes refused to jump obstacles. He was riding thus when cavalry charged the batteries. His aide-de-camp asked him if he was not going to draw his sword, and he replied: "I certainly shall not. Instead of aiming and firing the cannoneers would quickly follow my example, and then the cavalry would surely reach us." The charge was stopped fifty paces from the pieces, the cavalry being riddled through and through with canister.

Unfortunately there are reasons which prevent us from taking into the field soldiers who do not carry side-arms. They have need of them for this or for that purpose—during the march or in bivouac—perhaps to defend themselves against hostile inhabitants. Besides a soldier without arms cuts a melancholy figure.

General von Dresky wrote me in his letter, of which I have already spoken, that in traversing the narrow streets of Vionville on his way to the battle-field he placed the cannoneers of two of the pieces of horse artillery at the head of the column to clear the way of wagons, etc., which might obstruct the road. If these men had had no sabres it is certain that they could not have accomplished this task. But for this purpose it was not necessary that they should have been taught to make an attack; it sufficed that they could ride and use a sabre.

Generally one commits an error when, on account of an exceptional occurrence in campaign, one practices the men in the particular manœuvre then made use of. It is a useless expenditure of a part of the precious time assigned to the exercises and manœuvres.

It happened to me one day that a battalion of horse artillery under my orders was sent to occupy cantonments in the immediate vicinity of a place garrisoned by the enemy with no protecting force between the cantonments and the enemy. I do not know whose fault it was, and it is not here a matter of importance, that the troops of the other arms designated for the purpose had not yet reached their destination, but I do know that the battalion commander established grand guards, posted videttes, and threw out patrols in the direction of the enemy until, after several hours, the troops of the other arms arrived. But this occurrence has never put it into my head to demand, on account of this single and exceptional case, that the cannoneers of the horse artillery should be exercised in peace time in the service of advanced posts as practised by the cavalry.

In his recollections General von Dresky relates the following: "After the taking of Orleans on the 5th of December, 1870, the 3d Corps received orders to operate upon the right bank of the Loire, ascending the river in the direction of Bourges. The corps marched upon a single road in the following order: 5th Division; Corps Artillery; 6th Division;—and to avoid delays marched in extended order. I followed the 5th Division at a distance of about 2,000 yards. When we approached Gien on the 8th December we heard in front of us quite a lively fusillade, but it very soon ceased. I therefore continued my march, and very soon the artillery reached Gien, which the 5th Division had just passed through. It had had an affair with the enemy's light troops lodged in the houses of the suburb on the left bank of the Loire. The bridge was blown up and the river was full of ice. The streets of the city run parallel and perpendicular to the river, and when the head of my column entered one of the latter, isolated shots fired from the houses of the suburb reached us, probably fired by some of the light troops who had returned after the 5th Division had passed. As I had no infantry with me I could not, at the moment, undertake anything in the narrow streets of the city. Besides, I suffered no loss, for the enemy fired too high. At the exit from Gien the Briare road follows the bank of the Loire, which at this place has a breadth of about 500 paces. On one side of the river the road is lined with large poplars, and on the other side are houses. When I had passed the gate with a part of the leading battery the fire upon us from the suburb became so violent that I had some wounded. Fortunately the wounds were slight, and the horses

chiefly were hit. The trees protected us to some extent, and the enemy fired very badly. I ordered the leading battery to go into position and cannonade the enemy. The battery fired twice, a house was burned, and the enemy disappeared, so that I was able to continue my march without further annoyance."

It will hardly occur to any one to demand, in view of the exceptional occurrence just related, that the regulations should contain directions for practising artillery in traversing a city occupied by the enemy's infantry.

Perhaps you are not yet convinced and will still assert, in spite of all I have said, that the case could present itself in which the artillery should withdraw from its position precipitately.

You will acknowledge, perhaps, that if cavalry does succeed in approaching so nearly as to necessitate the greatest haste in retreating, it will then be altogether too late to withdraw, and consequently it will be by all means preferable that the artillery should continue to fire.

But, what say you, if it be infantry which suddenly throws itself upon you? You demand then that we follow the old maxims and reëstablish the principle that artillery should take to its heels when a few infantry bullets fall in the batteries.

It must stand firm; it can and it should stand firm even if the infantry comes within a thousand paces,—even within 500 paces. That is just the time when it will lend the most efficient aid to the infantry fighting at its side. It is then that it will decimate and drive back the enemy who thinks himself about to triumph.

But you will perhaps demand of me what the artillery will do if the enemy's infantry succeed in surprising it and show themselves suddenly within a hundred paces. Then the pieces could not possibly withdraw by limbering up and starting off at a trot, for the enemy's infantry would do at least enough execution to disable one horse in each team and then the pieces can go no farther and will necessarily be captured. Artillery in this case can save itself in but one way, and that is by repulsing the enemy by the fire of its guns. It may perhaps succeed in doing so even if the last shot be fired when the the assailant is no more than ten paces from the pieces.

The 5th Battery of 4-pdrs. of the Guard at Königgrätz, when about to retire from Rosberitz with a small force which was driven back by a superior force of the enemy, saw suddenly appear from a wide ravine hardly a hundred feet distant (so says the report of the battery) a mass of the enemy's infantry equal in number to a division of two companies. The captain ordered canister fire but the pieces were already loaded with shell and these were first fired and in bursting among the closed ranks of the enemy produced even more effect than canister. Thanks to this fire, combined with a rapid fire from a company which faced about, the enemy was driven back. The battery profited by this repulse to retire steadily and in good order.

Generally, artillery should never retire while an attack against it is in progress. This is the most favorable moment for the effect that it is called upon to produce. If it be ordered to withdraw it should profit by the moment when the enemy has been stopped by its fire and has drawn back to renew his attack when he shall have been reinforced. But if the artillery

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receives the order from the general in command to withdraw from the line (without an order it will never retreat) too late for it to do so steadily and in good order, then it should not attempt to retire at all, and if the pieces are lost it is not the artillery which will have been responsible for it. It is far better to fall gloriously in continuing the fight than to be captured while in flight.

These are the principles taught the artillery after the War of 1866, and which it observed in the campaign of 1870. It was in obeying them that it stood fast at Spicheren on the Roth Berg; that at Vionville the line of artillery held its position in the very midst of the fighting;—that we lost pieces gloriously at St. Privat, near Amanvillers and at Beaune-la-Rolande; and that at Coulmiers, where we lost the battle we lost no pieces. At Amanvillers we had more pieces temporarily disabled than we lost to the enemy, for many of the batteries, as was shown by their reports of losses, lost all the men and horses in the firing line, but later received other men and teams and continued to figure as active batteries. At Coulmiers we lost no pieces because the batteries took advantage of a moment when the enemy's attack was checked to obey the order they had received to withdraw from the action.

There were in the artillery regulations many other rules indicating the great importance attached to saving the pieces, and the very nature of these rules was such as to undermine the firmness of the arm when opposed to the enemy,—not that it feared the enemy, but because it feared to be blamed.

Let me cite some of these rules to you.

I have an old "Manual for Officers of the Prussian Artillery," and on page 696 of this manual, paragraph 5, b, relating to the choice of a position, I find: "It is necessary that the ground selected upon which to post batteries on the field of battle should be such that they can move in any direction, but *particularly to the rear*." If this rule had still been in force in 1870, General von Bülow would not have had the right at Spicheren to conduct the two batteries by the road through woods,—a steep and narrow road skirting a rough and rocky slope,—for the purpose of assuring the position upon the Roth Berg. In the same way Colonel von Dresky at Vionville, would have disobeyed the regulations in establishing his corps artillery in a position just beyond a marsh and narrow bridge which, besides, was under the enemy's infantry fire.

These two examples will suffice, I think. If I were to continue and cite all those I know I would fill a large book with them, for I am convinced that three-fourths of all the positions selected by our artillery in 1870 and 1871 belonged to the category of positions excluded by the regulations given above.

But after the War of 1866 these rules were modified. There was no more mention of retrograde movements. On the contrary, it was declared to be the sacred duty of the artillery to occupy with the greatest possible rapidity all positions taken by the infantry in order to insure a firm hold upon them. When it does this it has, nine times in ten, a defile in its rear and consequently no longer has liberty of movement "especially to the rear."

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In the case when there is no possible way of saving the artillery our manual indicates here and there an expedient. On page 812 you will find for example this regulation concerning the surrender of a fortress. "The officer commanding the artillery of the place shall determine all, both as to quantity and quality, that is in the artillery depot, and shall endeavor to obtain a receipt." *Sapienti sat.*

This manual was not a private publication, as was the case with the Compendium of Oelze but bore on its title page the words "By Authority," which gave it at least a quasi-official character.

We cannot resist a feeling of astonishment that such rules should ever have found place in the regulations of an arm which had performed so many glorious deeds in the War of Liberation. As for myself I find no other explanation than the following fact. The longer the period of peace, the more we find ourselves guided by the experience gained upon the field of manœuvres, and the more we neglect and forget the experience gained in war.

In the grand manœuvres up to the time of the War of 1864, as you doubtless remember, the greatest disgrace for the artillery was to be taken prisoner and to have its pieces captured. For the other arms it was a glorious thing to capture the enemy's pieces, and therefore they devoted their greatest energies to the attempt.

A good soldier risks his life willingly, but not his honor. It was wholly natural then that the artillery should not willingly expose itself to the danger of capture.

It is probably the result of this feeling, together with the spirit of faithful accountability and of over-scrupulous administration, which guided the officers who drew up the regulations, and which caused them to introduce these rules, which certainly were not the results of experience gained in war. For these officers had not made a campaign in the fifty years of continuous peace. That the veterans of the War of Liberation may have authorized the promulgation of these rules is explained by their great extent and prolixity. The manual of which I have spoken contains 871 octavo pages of small type. Where is the general of artillery who, in the midst of his engrossing professional duties, will find the time to read attentively and control minutely all that such an extended treatise contains?

In speaking to you of the rules contained in this book, I am not divulging the things of which the artillery made a mystery. The book was for sale, any one could buy it.

As to what relates to the avoidance by the artillery of the dangerous zone of infantry fire that also was introduced in the long period of peace. It was seriously held that artillery should avoid it. "Do you not see that you are exposed to direct infantry fire?" was one of the most severe reproaches that could be addressed to a battery commander at the grand manœuvres. An artillery line exposed to infantry fire was required to retire whether it wished to or not. If a captain declared that he did not wish to retire,—that he believed the moment to have come when he should hold his position in spite of everything,—he would be told not to talk such nonsense. The umpire always ordered this withdrawal, and he must be obeyed, otherwise the grand manœuvres would not have been possible.

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While infantry fire attained a much greater range by the introduction of the breech-loading rifle, the artillery, not yet having rifled pieces (say from 1850 to 1860) played a very unenviable part at the grand manœuvres, and this necessarily caused it to be greatly discouraged. It could seldom advance against an enemy to exercise decisive action, for the infantry arm carried farther than its piece, and it was not allowed to remain under its fire. Therefore every time that it occupied a position it was very quickly driven from it by infantry fire, the umpire always so deciding. Thus it was driven from position to position, and, while going from one to the other, had to take very good care besides that it was not captured by a squadron of the enemy's cavalry.

The other arms at this epoch preferred to engage the enemy's artillery rather than to have to do with their own. Their own was of no great assistance to them and they were obliged to defend it, for when they allowed it to be captured they were severely reproached. On the other hand they could capture the enemy's artillery, and in this manner distinguish themselves. Understanding all this, it is possible to comprehend the feeling of a certain not over bright officer who said: "I prefer not to employ the artillery at all. I am constantly found fault with on account of it."

I could cite hundreds, even thousands of cases in the War of 1870–71 which prove that artillery need not retire before infantry fire if it wishes to hold its ground.

This decision of the umpires at the grand manœuvres constraining the artillery to retreat before the fire of infantry can then be considered as wholly irrational.

It is unfortunate in its results; for, if repeated without ceasing during a long period of peace, all the officers commanding artillery who have not seen actual field service will end in believing that artillery really is incapable of successfully opposing infantry fire, and the natural consequence will be that in action they will withdraw from before it as many others have heretofore done.

The officers who have seen no field service will very soon form the majority in our Army. At this date fourteen years have passed since the battle of St. Privat, and upon our frontiers everything has so pacific an aspect that we are tempted to believe that war will not menace us during the remainder of the present century.

It is then essential that this warning should be plainly understood in time—that the utmost care should be taken during the long period of peace not to engraft upon the grand manœuvres the habits, the errors, by which false ideas are inculcated, and that we should not announce decisions upon which officers, bound to obedience, might guide themselves at the outset of a campaign, and by so doing expose themselves, innocently enough, to the very grave suspicion of having willingly avoided the fire of the enemy's infantry.

I say again, and cannot repeat too often, that *artillery can never be driven from its position by infantry if it does not choose to go.*

It is at the moment when the infantry fire is heaviest that it is least able to retire, because many horses will have been killed. But because it can-

not withdraw it should not consider itself lost. While some few cannoneers remain standing at the pieces who steadily continue to load and fire, it will preserve all its vigor, its full and entire action. This vigor and this action will not come to an end till the last cannoneer shall have been placed *hors-de-combat*.

Certainly the umpire at the grand manœuvres cannot always decide that the artillery is victorious, but he cannot oblige it to take to flight if it will not fly. He will have to render some other decision,—no matter what. He could, for instance, declare it to be annihilated. But if it has acted in conformity with its tactical principles,—if at the special point of view of the artillery it has done all that it should do,—the umpire, in his criticisms of the manœuvres, should praise and not blame it for having been annihilated, and should certainly not make it a cause for reproval. This is the only method possible to apply in the grand manœuvres if it be desired that in actual service the artillery shall always show that spirit of self-sacrifice which should animate it.

I cannot assert that all the umpires have adopted this method since the War of 1866. On the contrary, the decision that the artillery shall retire because exposed to infantry fire has been as frequently announced between 1866 and 1870, and even after the War of 1870, as before.

The artillery, however, has itself been animated with the desire to prove that it is as capable of standing fast under the fusillade as infantry is. It was then the arm itself which, animated by the true Prussian military spirit, took the initiative in its resolution to hold its ground.

This proves also that it was not the fault of the men who commanded the artillery in 1866 if their arm, without experience in actual war, basing its actions simply upon habitual practice and upon the rules given in the regulations, did not render service so signal, so brilliant, as it did in 1870.

In 1870 the artillery was greatly desirous of proving that it was the equal of infantry, a thing which the events of 1866 seemed to render doubtful. For this reason it acted in direct contradiction to the arbitrary decisions which had been announced up to that time. From this sentiment came the heroism displayed by the batteries posted on the Roth Berg, near Saarbrück, and the tenacity with which all the batteries at Vionville held the first position taken by Colonel von Dresky. It is this also which throws light upon the meaning of the captain of the 6th Light Battery of the Guard (Ising) when he was asked, after St. Privat when they were amputating his arm, whether he suffered much. "Suffer! That is nothing. I would willingly have lost my other arm also to prove that we could stand our ground against infantry fire." It is this same sentiment that explains the order given by an officer in command of an artillery line in 1870, when one of his subordinates remarked that the line was exposed to infantry fire and would probably have to retire. His answer was: "That is true. Sound the call 'Drivers' Dismount!' Now we cannot retire."

I will not annoy you farther with illustrations borrowed from military history, for they will finally tire you out. Perhaps that has already been done. Permit me only to add this conclusion, based upon statistics. If the military medical staff were required to make a report upon the number

of wounded in 1870–71 in the German artillery, a report showing how many of these were wounded by the enemy's artillery and how many by his infantry, the result I am convinced would be as follows: 65 per cent were caused by infantry fire. That is the proportion in the batteries under my orders and I have no reason to believe that the rest of the artillery has been any less obstinate in holding to its positions. The most tenacious were certainly the batteries of the Roth Berg at Spicheren and the line of artillery at Vionville.

If the artillery wishes to be safe, it must destroy the enemy. That is its only means of safety. If this fails,—at least it will have saved its honor.

MUSKETRY FIRE IN THE HILLS.

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(*Reprinted from the Journal of the United Service Institution of India.*)

THE question of up and down-hill firing is one upon which little appears to have been written, and as far as musketry fire is concerned nothing is at present laid down on this subject in the text-books. The Treatise on Military Small Arms dismisses the subject in these words: "Military rifles are always sighted for horizontal distances, and it is sometimes asked if the graduations on the back-sights would be correct in firing at objects at the same distances, but at a much higher or lower level. The answer is not a simple one, as it can be shown that in a vacuum the sighting for certain angles, both above and below the horizontal, agrees with the horizontal sighting, while for other angles there is a difference; the question is further complicated by the resistance of the air; at moderate ranges the ordinary sighting may be taken as sufficiently accurate." Words which would imply that the subject was one not worthy of having much attention bestowed upon it.

It is strange that this should be the feeling on the subject in these days when so much attention is given to everything else that bears upon musketry, when books are published every day which discuss the allowances to be made for wind, weather, height above the sea, fouling, and even the effect of a passing cloud, and when any practised rifle shot can tell the elevation required under almost any circumstances to the hundredth of an inch.

But if one comes to ask what effect will be produced if the range be sloping instead of level we at once find ourselves involved in uncertainty, and will receive answers somewhat as follows:

"I don't suppose it can make much difference," or, "I have never tried myself, but it stands to reason you must want less elevation firing down-hill and more firing up," this latter assertion is sometimes accounted for by the greater resistance of the air, sometimes by the force of gravity, this force being occasionally credited with extraordinary powers, for example, in the

course of correspondence on the subject of this paper, I have seen it asserted that if a bullet were fired vertically from a Martini-Henry rifle it would not (so great is the force of gravity) go 1,000 yards up in the air. If this were the case it would render a balloon reconnaissance a feat of small risk.

However, to leave opinion we will now come to the conditions of the problem itself, and I hope to be able to give a solution of it which, though not claiming rigorous mathematical accuracy, gives, I think, a sufficiently near result for practical purposes. The general conclusion which I have arrived at is this, that, while it is true that more elevation is required when firing up-hill than when firing at the same distance down-hill, yet that in both cases, less elevation is required than would be the case if firing at the same distance on the level.

I will then refer to the results of some experiments which through the kindness and courtesy of Mr. Coldstream, the Deputy Commissioner, and the municipal and police authorities, and with the able assistance of Captain Hayden and several members of the 2d P. R. V., I have recently carried out at Simla. A comparison of the elevation found to be necessary in each case with that arrived at by the theory, will, I hope, show the practical soundness of the latter.

At the risk of being tedious I will now go through the steps of the calculation by which the results are arrived at, and will endeavor to do so in as few words as possible.

The object of giving elevation to a rifle, as every one knows, is to counteract the fall of the bullet below the line of fire, which is due to the force of gravity, this force, when the range is horizontal, acts at right angles to the range, and any change in the amount of this force will make a corresponding change in the elevation required. Thus, the reduction of elevation necessary, when firing at a considerable height above the sea is to a slight degree due to the reduced force of gravity as well as the greater rarification of the atmosphere.

We must observe that it is the effect of the force drawing the bullet down to the range that has to be allowed for, and acting at right angles to the range, that has to be counteracted by the elevation of the rifle.

Now, when we come to a sloping range, if, according to the well-known principle of the resolution of forces, we resolve the force of gravity into two parts, one parallel to the direction of the range, and the other perpendicular to it, both of these resolved parts will be less than the force of gravity, since in a right angled triangle the side opposite to the right angle is greater than either of the other two sides. Therefore, when firing on an inclined range the force drawing the bullet from the line of fire (*i. e.*, the resolved part perpendicular to the range) is less than that when firing on the level, which is the whole force of gravity. At the same time, the other resolved part of the force of gravity, that parallel to the range, will act against the general direction of the bullet when firing up-hill and somewhat increase its time of flight, and consequently the time during which the force drawing the bullet from the line of fire acts, and when firing down-hill the reverse will be case.

The calculation will be as follows:

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Let the slope of the range be A°.

The resolved part of the force of gravity perpendicular to the range will be g Cos. A° and that parallel to the range g Sin A°.

Let R be the range in feet.

v " mean velocity of the bullet.*

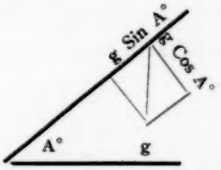
t " time of flight in seconds.

g " force of gravity.

H " drop of the bullet.

we have $H = \frac{1}{2} g t^2$; but $t = \frac{R}{v}$

$$\therefore H = \frac{1}{2} g \frac{R^2}{v^2}$$



Now let t_1, t_2 be the times of flight when firing down and up-hill respectively on a range equal to R, but sloping at an angle of A°.

The change of velocities at the end of these times due to the resolved part g Sin A° will be g Sin A° t_1 and g Sin A°t_2 respectively, and the change of mean velocities during the whole of these times will be $\frac{1}{2}$ g Sin A° t_1, and $\frac{1}{2}$ g Sin A° t_2 respectively and therefore the mean velocities of the bullet in the two cases will be

$v + \frac{1}{2} g \text{ Sin } A° t_1$, down-hill, and
$v - \frac{1}{2} g \text{ Sin } A° t_2$, up-hill,

but the time of flight is equal to the range divided by the mean velocity, therefore we have

$$t_1 = \frac{R}{v + \frac{1}{2} g \text{ Sin } A° t_1} \text{ and}$$

$$t_2 = \frac{R}{v - \frac{1}{2} g \text{ Sin } A° t_2}$$

Now since $\frac{1}{2}$ g Sin A° is very small compared with R and v† and as t_1, t_2, differ but slightly from t, they may without sensible error be replaced in the fractions by t, we therefore get

$$t_1 = \frac{R}{v + \frac{1}{2} g t \text{ Sin } A°} \text{ and}$$

$$t_2 = \frac{R}{v - \frac{1}{2} g t \text{ Sin } A°}$$

* This was approximated in the calculation by taking the initial and final velocities as given in the Musketry Regulations, page 237, and taking the mean, thus for 400 yards,

Initial	v	=	1315
v at 100	yards	=	1167
" 200	"	=	1053
" 300	"	=	982
" 400	"	=	922
		5	5439
Mean	v	=	1087

† It varies between 0 and 16·1 feet.

Taking the case of firing down-hill and substituting for $t, \frac{R}{v}$, and inverting we have

$$\frac{1}{t_1} = \frac{v + \frac{1}{2} g \frac{R}{v} \text{ Sin } A^\circ}{R}$$

$$= \frac{v}{R} + \frac{1}{2} g \frac{\text{Sin } A^\circ}{v}$$

Squaring both sides

$$\frac{1}{t_1^2} = \frac{v^2}{R^2} + \frac{g \text{ Sin } A^\circ}{R} + \frac{g^2 \text{ Sin}^2 A^\circ}{4 v^2}$$

The value of the last term is so small that it may be neglected, we therefore get

$$\frac{1}{t_1^2} = \frac{v^2 \times R g \text{ Sin } A^\circ}{R^2}$$

$$\therefore t_1^2 = \frac{R^2}{v^2 + R g \text{ Sin } A^\circ}$$

Now we have seen that the force drawing the bullet down perpendicularly to the range is g Cos A, and it acts for a time t_1; therefore if H_1 be the distance the bullet is drawn from the line of fire towards the range we have

$$H_1 = \frac{1}{2} g \text{ Cos } A \, t^2_1$$

$$= \frac{1}{2} g \text{ Cos } A^\circ \frac{R^2}{v^2 + R g \text{ Sin } A^\circ}$$

but $H = \frac{1}{2} g \frac{R^2}{v^2}$

$$\therefore \frac{H_1}{H} = \text{Cos } A^\circ \frac{v^2}{v^2 + R g \text{Sin } A^\circ}$$

But if E_1 be the elevation required to counteract H_1 we have $\frac{E_1}{E} = \frac{H_1}{H}$

$$\therefore \frac{E_1}{E} = \text{Cos } A^\circ \frac{v_2}{v^2 + R g \text{ Sin } A^\circ}$$

or

$$E_1 = E \text{ Cos } A^\circ \frac{v^2}{v^2 + R g \text{ Sin } A^\circ}$$

or in other words the elevation required when firing down-hill will be equal to that required on the level multiplied by the cosine of the angle of the slope, and by the fraction $\frac{v^2}{v^2 + R g \text{ Sin } A^\circ}$

Similarly E_2, the elevation required when firing up-hill will be equal to

$$E \text{ Cos. } A \frac{v^2}{v^2 - R g \text{ Sin } A^\circ}$$

The practical calculation of these quantities can be performed by a clinometer which I proposed at the end of 1887. An inspection of it will show that the value of E Cos. A° (which is the base of a right angled triangle of which E is the hypothenuse and A° the base angle) is given at once by the clinometer, while the corrections due to the fraction $\frac{v^2}{v^2 + R g \text{ Sin } A^\circ}$ are given in the table on the back of the gauge.

The value of this fraction was found to decrease from .994 at 400

yards range and 10° of slope, to .908 at 1,000 yards range and 60° of slope.

This fraction being less than unity the correction in the case of down-hill firing is subtractive.

Similarly for up-hill firing the correction due to the fraction $\frac{v^2}{v^2 - R\ g\ \mathrm{Sin}\ A^\circ}$ is additive.

The 'excess' of the latter fraction above unity is so nearly equal to the defect of $\frac{v_2}{v^2 + R\ g\ \mathrm{Sin}\ A^\circ}$ below unity, that for the sake of simplicity one set of corrections are given for the two cases.

The clinometer thus practically calculates the value of the expressions $E \cos A \frac{v_2}{v^2 + R\ g \sin A^\circ}$ and $E \cos A \frac{v^2}{v^2 - R\ g \sin A^\circ}$ for each range and slope. The only things which have to be ascertained independently being E, the elevation that would be required for the same distances on the level.

The principle of this clinometer has met with a good deal of criticism, to which the best answer I can give is to compare the results of the actual practice carried out, to which I have referred, with the results given by the clinometer.

The ranges experimented on were:

Down-hill at Kaithu.

A.	715 yards at a slope of.....	26°	46′
B.	1,110 " " "	24°	35′
	Up-hill at Sanjauli.		
C.	850 yards at a slope of.....	27°	52′
D.	960 " " "	28°	45′

It was found impossible at Simla to obtain steeper slopes of sufficient length.

The elevations are expressed in hundredths of an inch, as they can thus be easily applied to any rifle by an ordinary vernier.

It must be remarked that the elevations spoken of are the total height of the back-sight above the top of the fore-sight, while the ordinary verniers are graduated from some higher point. The difference for any vernier can be found by measuring the elevation for 1,000 yards given on the back-sight of a H. M. rifle, the amount of elevation shown deducted from 125, (the total elevation of the 1,000 yard line above the fore-sight) will give the correction to be applied to all readings of that particular vernier.

Now the correct elevations for level ranges of the same length as the above sloping ranges were found from a series of experiments on the measured ranges at Annandale to be

71.9
134.8
90.34
and 107.28 hundredths of an inch respectively.

The elevations for these distances on the respective slopes down-hill for A and B, and up-hill for C and D were calculated by the formula given above to be

61.83
115.47
83.61
and 99.17 respectively.

and the elevations found by independent experiment on these were found to be

63.62
113.70
83.35
and 98.10 respectively.

The error in each case being

— 1.79
+ 1.77
+ 0.26
and + 1.07 respectively.

these errors are equivalent at the target to errors in elevation of

— 1.6 feet
+ 2.2 "
+ 0.2 "
and + 1.3 " respectively or to errors in range of

— 12 yards.
+ 9 "
+ 1.7 "
and + 7 " respectively.

Which are errors that might be caused at those distances by a slight change in the wind or the light.

I do not suppose for a moment that such accuracy in the adjustment of the sight or anything approaching to it would be possible on service. All I propose in this paper is to draw attention to the law in accordance with which the sighting of the rifle is affected by the elevation or depression of the object above or below the firer and I think it will be admitted that a knowledge of the law, even approximately, cannot fail to increase the effect of fire on steep slopes, especially at long distances, and in cases where the fall of the bullets cannot be observed.

THE DESIGN AND ARMAMENT OF COAST BATTERIES IN FRANCE.

(*Extract from the Royal Engineers' Journal of December 2, 1889.*)

WITH reference to recent discussions in the public press in this country on the questions of coast fortification, it may be of interest to publish the following notes from a remarkable series of articles by Captain V. Fabre, of the French Artillery, which appeared in the *Revue d'Artillerie* in 1886–87.

The writer has, since 1886, been one of the officers specially charged at the French War Office with coast defense, and it is believed that recent modifications in the system of coast fortification in France are in harmony with the views which he has put forward in these articles.

With the object of defining the *rôle* and method of employment of fortification in coast defense, he first examined, from a theoretical point of view, the general conditions of fire from batteries, and specially the influence of altitude on their offensive power. He then carefully reviewed the various types of war-ships belonging to the Great Powers, which might take part in coast warfare, examining more particularly their defensive qualities. And he arrived finally at certain conclusions, of which the following is a brief summary:

1. THE GENERAL CONDITION OF THE ATTACK AND DEFENSE OF COASTS.

Enterprises against a coast line are of two sorts, which differ according as their object is to effect a landing or a bombardment.

The development of modern armies, and the facilities of concentration afforded to the defender by the new rapid means of information and communication, have deprived the landing of troops of a great part of its former strategic importance.

It is not so, however, as regards a bombardment, which the progress of artillery renders daily more formidable for the military and commercial establishments of the Littoral.

The protection of the maritime frontier is confided, in the first place, to the squadrons and mobile sea defenses as a general means of protection against any sort of attack; next, to the mobile land forces against any attempt to effect a landing; and lastly, to the fixed defenses by land and sea against a bombardment.

2. THE RÔLE AND VALUE OF COAST FORTIFICATION.

Coast fortifications constitute the only really efficacious and certain means of protection against bombardment. They are therefore indispensable round military and commercial ports exposed to attack from the sea, and it is advisable to extend their employment in proportion, as by improvement in the means of attack, a greater number of points are threatened.

3. ARMAMENT OF BATTERIES.

It appears that the armament of coast batteries should comprise four descriptions of ordnance:

(*a*) Battering guns (*canons de rupture*) capable of perforating the heaviest armor afloat. Calibre, 34 cm., or 13.385 inches.

(*b*) Bombarding guns (*canons de bombardment*), intended to act against the exposed parts of a ship and against armor of inferior thickness. Calibre, 24 cm., or 9.445 inches.

(*c*) Rifled mortars for the attack of armored decks. Calibre, 32 cm., or 12.597 inches.

(*d*) Light guns intended to counter-batter the quick-firing artillery of the ships, to protect the batteries against attempted landings, and to act against unarmored ships of small size and great speed. Calibre, 95 mm., or 3.74 inches.

As regards the proportion of these four descriptions of ordnance, it is necessary to take account above all of the fighting distances. Up to 1,500 or 2,000 metres the accuracy of fire is very great, and almost the same for both ships and batteries; consequently the latter can and should have recourse to a battering fire (*tir de rupture*) in order to fight on equal terms with the ironclads. But beyond this distance battering fire becomes impossible owing to the small amount of armored surface opposed to it and the diminution in the *vis viva* of the projectiles. It is in that case necessary to make use of bombarding guns and rifled mortars.

Hence the necessity of having two sorts of batteries; the one intended to act up to 1,500 or 2,000 metres—these are the battering batteries (*batteries de rupture*), armed with ordnance of the first category; the other, of which the action is intended to reach beyond 1,500 or 2,000 metres—these are the bombarding batteries, armed with ordnance of the three last-named categories.

4. COMPOSITION OF THE BATTERIES.

In the case of battering batteries, the rapidity of the fight makes it necessary to dispense with careful laying, which, besides, is unnecessary owing to the accuracy of the ordnance at the short ranges in question. The guns will fire independently, and their number and distribution can be fixed arbitrarily.

On the other hand, in the case of bombarding batteries, where the ranges are not limited, and in which the number of shots fired is relatively considerable, the success of the firing depends principally on the laying, which implies the collection of a certain number of guns of the same calibre and of the same pattern. Each battery, or fraction of a battery, placed, as regards the firing, under a single direction, will consequently form a homogeneous group composed as far as possible of four guns, having a common field of fire of at least 100 degrees.

In the association of the three descriptions of groups representing the constituent units of these batteries, whilst taking account of the local conditions and necessities of the defense, it is necessary to consider the greater importance of bombarding guns, and the generally useful character of light guns.

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The choice of the description of projectiles to be employed in each particular case ought to be subordinated to the defensive organization of the vessel fired at. It is therefore essential that battery commanders should have at their disposal tables of information and drawings enabling them to recognize at least the type of vessels in sight.

5. CARRIAGES.

Carriages for coast-defense guns should all allow of their guns returning automatically into the firing position, after a shot has been fired.

It is also desirable that the individual who lays the gun should have within reach special means of regulating lateral and vertical movements.

The maxim depression which should be arranged for in the case of 24 cm. guns should be from 5° to 7°, and in the case of 95 mm. guns from 12° to 15°.

All the carriages should be provided with bullet-proof steel-plate shields for the protection of the gun detachments.

6. THE ESTABLISHMENT AND ORGANIZATION OF COAST FORTIFICATIONS.

A.—Important points, such as great military and commercial ports exposed to regular attacks, require:

(1.) The defense of the immediate neighborhood of the position, at the entrance, channels of approach and interior ports and roadsteads by means of battering batteries (*batteries de rupture*).

(2.) Exterior defense, embracing all the sea surface from which it is possible to bombard the position by means of bombarding batteries.

These batteries, erected on heights, if the country along the coast line permits, will be invulnerable at close ranges; and, if the coast-line is low-lying, they can be protected from attacks at close quarters either by providing them with armor, or by erecting between them armored battering batteries.

B.—Secondary points, exposed to the assaults of isolated vessels of the second or third class, require for their protection two or three bombarding batteries armed with guns of medium and small calibre.

Generally, when recourse is had to armor-plating, costly constructions, such as movable turrets and armored casemates, will be avoided, except where attacks are feared on the flank or in reverse; it will be sufficient to have an armored straight wall.

As for open batteries, whether in earth or masonry, they will be able to fight successfully at long ranges against ironclads, provided that their epaulments have sufficient resistance, and that they are almost wholly defiladed from view from the sea.

Earthen epaulments should be about 12 metres (40 feet) thick; but it seems that the only means of rendering them really impenetrable to shells of large calibre is to cut them out of the natural earth.

Powder magazines should be constructed underground if possible, either inside the work or outside.

In no case should the walls be exposed to view from the sea.

Care will be taken to conceal from view all the details of construction of the batteries by the suppression of projections and sharp lines in the earthwork, and by plantations on the exterior and superior slopes.

G. A. K. WISELY, Captain, D. A. A. G.

LETTERS ON INFANTRY.

BY PRINCE KRAFT ZU HOHENLOHE INGELFINGEN.

Translated by LIEUT. ODON GUROVITS, 11th U. S. Infantry.

VIII.

BATTALION DRILL.

IN my previous letters I endeavored to explain the object of the various stones entering into the foundation of a handsome edifice, which represents our infantry; to-day I reach the main story—the companies formed into a battalion.

We have in our battalion drill the simple, elementary movements of the drill tactics and the movements incident to the fight. Those relating to the fight are so elastic that they may be adapted to every possible condition and are not only entirely sufficient, but could hardly be better devised to give the essential principles as well as ample play for the originality of the leader and also to allow the full development of the sub-leader's sphere so very necessary with the new method of fighting in dispersed order. No matter how often I pored over these regulations, I never could but admire the spirit pervading them, which is expressed to its fullest extent in par. 112 to 127 (the latter, though given for the brigade, is also valid for the battalion). Nevertheless, one very frequently finds that the most important paragraphs of the regulations are not observed at drill. On the contrary, as the years remove us farther from the experience of the latest war, our battalion manœuvres become less assimilated to actual war conditions, owing to the rigid adherence to a customary form or pattern on the drill ground, *unless the inspecting officers work constantly against such rigidity and insist that the forms be considered secondary and that they be in conformity with the spirit intended.* But this is extremely difficult to attain, because this adherence to form and system are not due to the idleness but to the highly strained zeal of the battalion commanders.

In addition to this, the very method in which the battalion commander conducts his battalion instruction tends to remove that method from the conditions met with on the battle-field. This appears to have its origin in the zealous endeavor to bring the battalion up to a high degree of excellence.

To support my assertion I shall mention a few detailed examples.

The regulations, page 152, say explicitly: That, when within the effective fire of the enemy, the employment of the battalion column can be justified only by extraordinary circumstances. Yet, during the greater part

of the time at battalion drill, when the deployment of the firing line from the battalion column is ordered and executed, one very frequently sees the skirmishers early engaged in a fight while the battalion in column is in such close proximity behind them that it would be unavoidably drawn into the fight on that account. At most it is attempted to advance the companies from the flanks, endeavoring to approximate the model pattern by bringing the companies of the centre up exactly behind the centre of the interval. It is permissible to advance any one company and as many of them as desired, yet, this and the various methods permitted by par. 111, as well as by the definitions of par. 112, are made use of but very seldom. Occasionally at the close a few movements are executed with companies in two or three lines, but without demonstrating how this would be applied in a fight. Observe the very simple manner in which a firing line, lying down on the ground, may be reinforced. According to the regulations order should be preserved, the men pertaining to different subdivisions should not be mixed up. In case a subdivision advances in open order with a view to reinforcing skirmishers in the firing line, it usually happens that the skirmishers at that point rise, and, moving to the right and left, make room for the new subdivisions. How would it be possible to execute such movements if the firing were so well directed that reinforcements became necessary? Would not the suddenly rising skirmishers be sure victims of the enemy's projectiles? Could not the first units sent out from the main body in swarms, leave between their subdivision the intervals required later for reinforcements?

Would it not, for this reason, be easier to keep the fire under better control, the men not being extended over so much ground and therefore easier commanded? Would not the different swarm-units, if a good cover presented itself, be more quickly assembled behind such cover? These faults are best observed when several battalions are in line near each other in the brigade. In such a case we find that the skirmishers are instructed to cover the entire front and are directed to increase the distances between men so that the entire front may be equally covered, as if it would be a great misfortune should it happen that an interval of 200 paces were left open between two platoons swarming out in dispersed order—as though an enemy could possibly break through such an interval. Consequently, the distance between files often exceeds 10 paces; the regulations, however, say that six paces per file or *three per man* are the maximum intervals allowed. Again, does one ever see the battalion commander leave it to the judgment of the officers in the firing line to order, as the particular stage of the fight might demand, individual, rapid, or volley fire, or to determine the number of rounds to be fired? Or does he ever allow the companies ordered to advance as supports to take such column or line formation as the circumstances may require? Does he not prefer, in order to maintain uniformity and nice appearance, to compel all companies to advance in the same order? In a real fight, however, is he ever enabled to order anything of the kind?

As to the stereotyped manner of executing manœuvres, caused by the regular shape of all the drill grounds, which very frequently prevent the

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execution of the contemplated formation in any but a mechanical and much repeated fashion, I shall mention but one case. If the battalion be in dispersed order in the fighting line and the assembly sound to form in column on the centre, as usually happens before dismissing, it will usually be dressed, to face one of the sides of the drill ground because it will march past in review. A battalion, therefore, is seldom practised in assembling quickly on an oblique front, and it usually causes embarrassment and delay should an order be unexpectedly received to assemble facing that church steeple or this poplar tree. To do this rapidly is a necessary feature of practical instructions, and if it be neglected it will take too much time and cause unnecessary fatigue to the men, to place masses quickly according to the ground, for example, behind an elevation under cover.

There are innumerable drill-ground customs, not to speak of aids and tricks all impracticable in war, yet conducive to a more exact and pleasing show drill.

Every military man is familiar with them, I do not wish to weary you by an enumeration, but will proceed to the actions and conduct of the battalion commander.

At the beginning of the fighting drill, you will observe the battalion commander stop near that skirmisher who fires the first shot, and who for that purpose, lies down to get cover. The battalion commander during all this time, remains mounted, but should he suddenly remember that he never could take that position in action, he will only retire a short distance towards the support. From thence he gives his commands and orders signals. If it is intended to execute a new movement, a flank attack or to reinforce a part of the fighting line, he will almost invariably go in person and superintend everything himself. This is especially so if a mistake is made, an order misinterpreted, a wrong fire employed, or something else done not in accordance with his ideas. Hundreds of times in one hour would he have to be pronounced *hors de combat*. He was everywhere except at that place where he should have remained during the entire fight, *i.e.*, with that company, which he retained as a last reserve, and with which he enters the firing line. Otherwise he would give up the lead and control of the battalion at the very onset. These extreme cases taken from life on the drill-ground create dangerous illusions in the minds of those who have never witnessed the realities of the field of action. They think that such *is* reality, and when in action time and space are not adapted to the calculations made and taught on the drill-ground, then many a one losses his self-control. More yet, the men accustomed to see the major on the drill-ground, constantly at the head of the troops put him up to ridicule when he remains at the rear with the reserve company as soon as the bullets begin to whistle; and, as a consequence, the field and general staff officers,* at least in the first battle, continue to ride where they did during peace in order to avoid such ridicule.

About 1850, a general of high grade and an old fighter of the Wars

* *Advisory officers.* Whenever "general staff officer" appears in the text of any of these letters, the above, might be substituted for information of such readers who are not yet familiar with the duties and functions of that officer in the German Army.

for Liberty, in one of his criticisms, censuring such irregularities, said with his peculiar sarcasm, that he believed the first ball cartridge fired would restore the proper condition of things.

But he was mistaken, for during the battle of St. Privat, the field and general staff officers actually rode where they were accustomed to ride in peace, and as a consequence, on the day following that battle but a small fraction of these officers and the adjutants of the infantry of the Guard, were available for duty. The majority were dead or wounded. That was very honorable, but unnecessary and, as far as Army and Fatherland were concerned, of the gravest consequence.

While discussing these questions around the green table* everything seems to be as clear as daylight, and one is astonished that such a condition of affairs as related can occur at all. Yet they do occur very frequently, and there must be some underlying causes which are well worth while to investigate, should it be deemed desirable to avoid their serious consequence. Among others we will refer to the fact that the battalion commander when he begins the drill mentioned, cannot very well remain at the place where he should be during an engagement, *i. e.*, with that company which he desires to engage last of all in the fight. He has occasion almost every instant to instruct and correct, and must ride hither and thither, and, should it be his intention to proceed to his proper place, some occurrence in the firing line will certainly require his presence there. Therefore, he prefers to remain with the firing line. Theoretically it would be better if he should let the faults pass by unnoticed until after the drill, and then correct and instruct, or do so during the time given for "rest." But this is not practicable. He would then find so much to correct that he would frequently have to interrupt the drill in order to lecture the assembled officers, and might be tempted to postpone his remarks until the following morning before marching out, when, after finishing his lecture, he would find that the time allotted for drill had been entirely taken up by his remarks and that he would, therefore, be obliged to dismiss his men for their noon meal. I once witnessed such an occurrence myself. Furthermore, a short remark made immediately after a mistake occurred is much more instructive than the most elaborate, theoretical explanation made some time after the occurrence. Again, if the battalion commander wishes to rectify every error he can do so only by being near the firing line. As an example, I mention, that he cannot observe wrong pointing and cannot hear commands given for wrong kinds of fire, if he be in his proper position. Thus it occurs that the battalion commander in the first few days allotted to the fighting formation and drill must remain where he never could be in action, and it finally becomes a habit with him to be there. The only day when he will move around as required in action is, therefore, the day of inspection. But it is asking too much of any man to do away on this one day, with everything, which by that time, has become habitual with him. Moreover, will he, for that day when he has to show how much he has taught his men, and is, therefore, anxious that no mistakes occur, adopt a method of giving orders alike new to himself and to the battalion?

*Table at which military topics are discussed and Kriegspeil played. *Translator.*

You might answer to this effect: That the battalion commander could, when he instructs in the preliminary principles, go wherever he chooses, but that during the latter half of the time allotted to the fighting drill, he should be compelled to remain in his proper place for action. This is a very nice proposition but impracticable. The time for battalion-drill is so short that the commander must be satisfied if he succeeds in going over once everything contained in the tactics referring to battalion drill. He cannot, therefore, divide the time into two parts; the one for instruction in elementary principles, the other for application. Consider also that if from the three weeks allotted to battalion drill, we deduct Sundays, holidays, days for the performance of guard, garrison and fatigue duties, but ten remain for drill—and that is considered a very favorable proportion. Those battalion commanders who adopted this method of instruction surely had but two days left for real practical instruction in battalion drill, *i. e.*, the day of inspection and the one preceding it. Then it certainly happened that on the day preceding inspection, he practised only those manœuvres which he desired to execute the day of inspection, and as a consequence, the inspection was finally converted into a theoretical performance or military ballet, thus losing its value as an inspection for warlike preparation. This inclination of the battalion commander to be everywhere in person and to superintend everything is further brought about by the inspecting officers holding the battalion commander responsible for every mistake made. A few remarks made by the inspecting officer, such as: "Do you observe, Major, how that Xth company takes position?" or "The skirmishers of such company advance at double time: that is wrong." And the major will gallop from one platoon to the other in order to prevent the recurrence of what displeased the inspector. It also happens that many battalion commanders, in drilling their battalion, rarely ever go beyond par. 77 to 98 of the fighting tactics and but seldom attempt to practice the fourth part of these tactics.

If he succeeds in executing these paragraphs with precision and excellence, then the battalion makes a favorable impression upon the inspector and the mistakes and omissions of the fourth part are passed over altogether by the inspector, or else looked upon with less severity. This, however, takes us back again to machine ideas and to "shock tactics," which are impracticable since the introduction of improved fire-arms and will finally result in nothing save the unnecessary slaughter of masses. I have often heard bitter complaint made about that superficial, showy preparation going on for the inspection. But, if ever a reproach was unjustified, this is one; because the efficiency of a body of troops depends upon the result attained when the aim of the battalion commander is reached, and also upon the discipline and obedience consequent thereto, not that blind obedience, executing nothing but what has been ordered and always waiting for orders, but upon that obedience, which meets half-way the ideas of superiors—always trying to foresee them with a view to understanding thoroughly their spirit. Therefore, any one who prepares his troops in such a manner that it is pleasing to superiors, is not currying favor, but shows that he possesses the spirit of obedience which made our Army great.

XUM

I have, however, witnessed amusing incidents owing to the desire to personally superintend and order everything. I think that I have previously mentioned to you that during a skirmish of a reconnoitring battalion I observed the division, brigade, regimental and battalion commanders all remain with the foremost firing line. They were accompanied by their staff and a reigning German prince. Being accustomed at inspections to order and superintend everything in person, and also to act upon the principle that the battle is but the highest order of inspection, they acted as accustomed during peace. On another occasion a division advanced in close column against the enemy.

The division commander, with the brigade, regimental and battalion commanders of the leading brigade, again rode immediately behind the vanguard; and the first man wounded was a trooper detailed as orderly, who dropped from his horse, having been shot in the breast while riding behind the general.

Disregarding the fact that this leads to an unnecessarily great loss among the higher officers, and also loss of control and coherency, such conduct has additional disadvantages. Every man has but a fixed amount of physical and nerve force. If any one expends his physical power before it is required he runs the risk of lack of power at the decisive moment.

The same remarks are applicable to the nervous system. None of us are altogether indifferent to death, it is simply our nerve power which gives us sufficient self-control to be fearless in times of danger. That commanding officer who enters the firing line earlier than necessary, runs the risk of lacking nervous and physical power at the decisive movent. This is not due to sudden cowardice, but to the strained nerves which cease to act in sympathy. Gradually he is overcome by nervous prostration and mental weakness; doubts begin to bewilder him in the shape of tactical and strategical reflections, which convince the leader that all the rules of the Art of War now demand is a waiting attitude, or the defensive; to refuse the centre and other nice scientific formations. We have such a case in a commanding officer, who remains with the leading skirmishers from sunrise to noon, who hears the bullets whistle around him for five or six hours (the advanced guard battalion being employed in thrusting back the hostile outposts) and who finally arrives where the enemy in a well-selected position, awaits the attack. The enemy, not having time to retire in good order, is forced to await the attack; but the commanding officer making the attack is suddenly led to believe his men too tired, he himself being tired out (the fact of the case is that the attacking *battalion* is the only one that is tired), and so believes that his men, having been under fire five or six hours, have done their duty for the day. Then he resolves to postpone the attack until to-morrow, by which time the neighboring divisions will have arrived, therefore, he posts his outposts and lets his division rest for the day. The enemy, however, taken by surprise in the attack of the morning is again surprised, but very agreeably, however. He finds time to withdraw without loss and avoids the threatened catastrophe. Had the leader in question rested longer, had he not expended his energy by staying six hours in the skirmish; had he at that moment, when he ordered the fire to cease, arrived at the place with

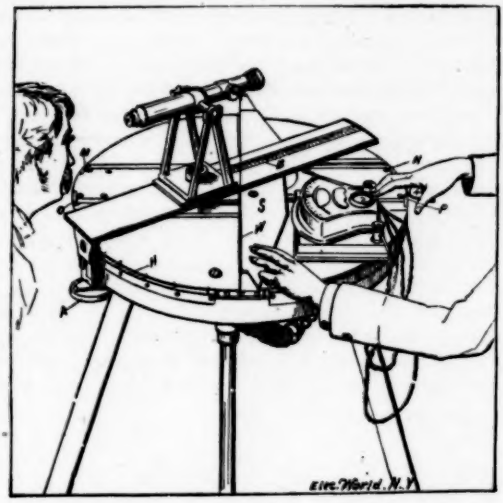
the main body, he himself full of vigor, he probably would have considered that nothing at all had as yet been done, and would certainly have ordered the general attack.

Thus eagerness and overzeal to conduct everything in person on the part of a commanding officer may at times be the real reason for absence of energy; and the too early exposure, the cause of a hesitating method of attack. Towards the close of our last campaign such irregular line of action on the part of leaders while engaged in a fight ceased entirely. After the war it was not even to be observed on the drill grounds. But in a short time it again made its appearance. The longer peace is preserved the more it threatens to again become a habit. This is caused by the Service, in time of peace, looking upon a successful inspection as the mark to be attained as well as by the gradual removal of our experienced officers from active duty. "Experience in actual campaigning has but a limited value," says a certain theoretical authority on the Art of War, much to the general amusement. But in a certain measure he is right. Each grade gathers experience in a war only in the duties of that grade and probably the grade immediately above it. Thus, a company chief, within his own sphere and that of a battalion commander, but not within that of a regimental or brigade commander. There are exceptions viz., the young officers (general staff officers) who learned to regard war from the standpoint of the higher officers (generals or division commanders) and who saw war with open eyes. Now, after thirteen years' peace, the promotion having gone on regularly, I wish, for the welfare of the younger generation, that we might even have no more battalion commanders who led a company during the last war.

How could a lieutenant who commanded during war only a platoon gather sufficient experience to know how to act as a battalion commander? If he is required to command a battalion, he will lead and instruct it so as to be successful at the inspection.

Knowing the inclination towards unwarlike instruction of the battalion towards stiffness, towards irregular conduct, and towards an impossible method of giving instructions, the next question is to find out how to guard against such irregularities. I shall entertain you in my next letter with this question in order to prevent this letter from becoming wearisome. I shall, however, state to-day that at the inspections, drills and manœuvres it should constantly be insisted upon that the leaders, including those of the lower grades, remain where they must be in action.

XUM



LIEUT. FISKE'S RANGE AND POSITION FINDER.

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IN gunnery practice, the success obtained depends, evidently, upon the accuracy with which the distance of the object fired at is judged by the gunner. In order to obtain greater accuracy in firing, therefore, independent of the mere judgment of those handling the guns, various means have been proposed in the past and some, indeed, applied to a limited extent. Among these we may mention the plane table method, by which two observers stationed at the ends of a known base line obtain the angles at their respective points between the base line and the object to be fired at. The angles thus obtained are plotted on a plane table and the distance determined by scale measurement. This requires some method of communication between the two observers at the end of the base line, which, in the past, has usually been done by flag or "wigwag" signals, or, in some cases, by means of a telegraph line connecting the two observers. The method in either case is a tedious one, and hence other means of accomplishing the object have been sought. But for ships the problem of range finding has heretofore been considered almost unsolvable.

A splendid solution of the matter has, however, recently been achieved by Lieutenant Bradley A. Fiske, of the United States Navy, and as his new range finder marks a decided departure in this important field, and involves a beautiful application of electrical principles, we propose to give our readers a complete description of it.

Before entering into the actual construction of the apparatus it will be well to fix in the mind of the reader certain preliminary principles involved. Thus in Fig. 1, let *a b c d* represent the four members of an ordinary Wheatstone bridge, and *g* the transverse member, in which is connected the galvanometer *g'*. A battery *f* is also connected to the bridge in the usual way. In the members *c* and *d* are placed the fixed resistances *c'* and *d'*, and in the member *b* the variable resistance *b'* also, as usual. One wire from battery *f*, however, connects to the end of member *c*, and also to the pivot *l* of a swinging arm *i*. The extremity *k* of arm *i* moves over and maintains electrical contact with an arc *h* of conducting material, which has one extremity *j* connected, as shown, to the member *a* of the bridge. It is obvious that when the arm *i* is in the position shown in full lines in Fig. 1, then the current will traverse the whole arc *h*, and when the arm is in the position indicated by dotted lines, then the arc *h* will be cut out and the current will pass directly to member *a*. Now, let us assume the arc *h* be made of such material and so proportioned that its electrical resistance to a current traversing it will be proportional to the length of arc included between the contact end *k* of arm

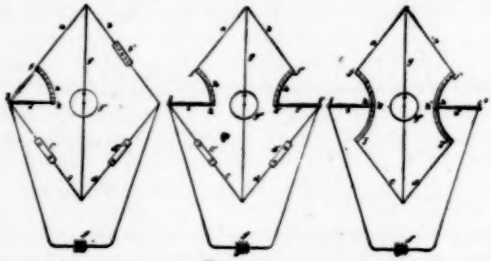

FIG. 1, 2, 3.

i and the connecting point *j* of member *a* with the arc. Therefore the resistance interposed in the member *a* of the bridge will be commensurate with the angle *j l k*, and if this resistance be known the angle is also known. Let it now be assumed that the galvanometer *g'* and variable resistance *b'* be located at some point distant from the moving arm *i*, from which the arm is invisible or inaccessible. Clearly, then, an observer stationed at the galvanometer *g'* and resistance *b'* can, by noting the galvanometer and adjusting the resistance in the usual way, determine the resistance equilibrating any position of arm *i* along the arc *h*, and so discover the angle of adjustment of the arc; or, having adjusted the resistance *b'* at some given figure, the observer may, by simply noting the galvanometer, determine when the arm *i* is placed at a desired angle corresponding to the adjusted resistance, and this indicating device may obviously be at the place where the moving arm is located, so that the operator there may thus know when he has placed the arm at the predetermined point or at the distant station; in the same way the operator in charge of the resistance *b'* may know that the arm has been adjusted properly; or two indicating devices in the same circuit may give warning to both operators simultaneously.

Various practical applications of this apparatus will readily suggest themselves. Thus, for example, the elevation or training of a gun may be determined or recognized from a distant point, the longitudinal axis of the gun corresponding to the arm *i*.

Referring now to Fig. 2, it will be apparent that in lieu of the variable resistance *b'* in the member *b* there is arranged an arc *h'* and swinging arm *i'*. The arc *h'* is connected at one end *j''* to the member *b*, and the swinging arm *i'* makes contact at one end *k'* with the arc, and to its pivot *l'* is connected the member *d*. The arrangement and construction of arc *h'* and arm *i'* are similar to that of arc *h* and arm *i*. Consequently when the arm

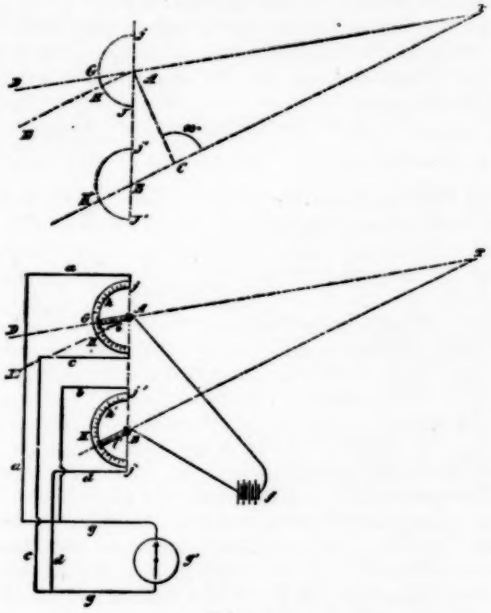

FIG. 4, 5.

i is set at a certain point on the arc *h* the arm *i'* must be set at the corresponding point on the arc *h'*, in order that the resistance of the lengths of the arcs *h h'*, respectively, between the point *k* and point *h* and point *k'* and point *h'* may balance; hence if the arm *k* be set at a certain angle the observer at arm *k* may recognize that angle by noting the position of the arm *k* and the galvanometer, as before. It will be observed, however, that the effect of moving the arm *i* over the arc *h* is practically to lengthen or shorten, or to interpose more or less resistance in, the member *a* of the bridge, and by operating the arm *i'* a like effect is produced in the member *b*. The resistances or lengths of the members *c* and *d* remain unchanged.

Referring now to Fig. 3, there is shown the arrangement which forms

the specific basis of Lieutenant Fiske's invention. Here the arc h is connected at its respective ends j j' to the members a c and the arc h' is similarly connected at j'' j''' to the members b d. The battery wires connect to the pivots l l' of the arms i i', as before. Now, when the arm i is moved from its middle position on its arc toward j, less resistance is caused in the member a and more resistance in member c, and when moved in the opposite direction the reverse occurs. So, also, a similar effect is produced by moving arm i', and thus the resistance offered by all four members of the bridge may be affected instead of that due to only two of them, and differential results may be obtained, as will more fully be apparent in the following description of the device for measuring distances.

Referring to Fig. 4, let T be the position of the object, the distance of which from the point A it is desired to ascertain. Let AB be any short base line. Draw AC at right angles to BT, EA parallel to BT, and prolong AT as to D. By trigonometry

$$\left.\begin{array}{l} AC=AT \sin ATC \\ AT=AC \operatorname{cosec} ATC \end{array}\right\} \text{ and } \left\{\begin{array}{l} AC=AB \sin ABC, \text{ whence} \\ AT=AB \sin ABC \operatorname{cosec} ATC. \end{array}\right.$$

AB being the measured base line, is known, and the angle ABC at the point of observation is easily determined, so that the angle ATC remains to be found; but $ATC=DAE$ and DAE is subtended and measured by the arc GH. Arc GH=arc jH — arc jG, and arc jH=arc $j'K$; hence arc GH= arc $j''K$ — arc jG.

In Fig. 5, the diagrams Figs. 3 and 4 are combined, i i', as before, being swinging arms traversing the arcs h h', and the connections a b c d of the bridge being present also, as before. Let the arms i and i' represent telescopes, both directed upon the object T. The arcs jG and $j'K$ not being equal, the bridge will not balance; but when the telescope i is moved to the line EH then the bridge will balance, but the distance thus moved is the arc GH, the length of which may be read off from the arc h itself. It will be seen, therefore, that the operation of determining the distance AT becomes, by the aid of this apparatus, exceedingly simple. The observers at the respective telescopes i and i' direct their lines of sight upon the object. The observer at i notes the angle jAG or length of arc jG. He then moves the telescope i until the galvanometer g', which is placed conveniently near his position, shows no deflection and notes the angle jAH or length of arc jH. The difference between the arcs jG and jH equals the arc GH, whence the angle ATB, and hence the distance AT, is found by the observer at the arm i, or, in other words, by an observer at the base line. The disposition of the apparatus, whereby an observer at a point distant from the base line may at once read off the distance AT from a suitable scale will now be explained.

Referring to Fig. 6, the members a and b of the bridge are connected to opposite extremities of a bar m n of conducting material, and the members c d are connected to the extremities of a similar and parallel bar o p. Adjustable upon these bars is a slider r r', having a middle portion s of insulating material, so that the current from bar m n, for example, does not pass across the slider r r' to bar o p, but proceeds by the wire g through the

galvanometer g'', which here takes the place of the galvanometer g' in the preceding figures.

Suppose, now, that the telescopes i and i' are sighted upon the distant object T, as before, and that the slider r is at the middle point 1 of the parallel bars $m\ n$ and $o\ p$. The resistances in the bridge will obviously not balance, and the galvanometer will be deflected. It has already been explained in connection with Fig. 5 how, by moving telescope i to the point H, the resistances might be balanced, and if that were done, with the arrangement shown in Fig. 6, the fact would obviously be indicated by the galvanometer standing at zero; but, now, let it be assumed that the telescope i, after being sighted upon the object T is not moved, or, in other words, that the observers respectively at the two telescopes i and i' simply adjust their instruments in line with T. Obviously, then, the distance of the bridge r to G (member a) is less than the distance from r to k (member b) by the length of the arc GH. Similarly the distance on the bridge from r' to G (member c) is greater than the distance from r' to k (member d) by the length of arc GH.

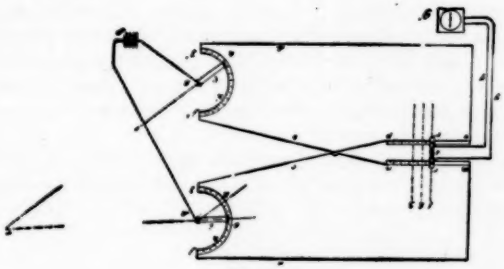

FIG. 6.

Now let the resistance per unit length of the bars $m\ n\ o\ p$ be made equal to or with some definite relation to the resistance per unit length of the arcs $k\ k'$, and lay off on bar $m\ n$ a distance of r 3, and on bar $o\ p$ a distance of r' 3, these distances being such that the resistance due thereto will be equal to that of the arc GH. Clearly, if the end r of the slider be moved to the position 2 on bar $m\ n$, the member a will be increased and the member b will be diminished by the distance r 2, which offers a resistance equal to one-half that of arc GH, and if the end r' of the slider be moved to the position 2 on bar $o\ p$, then the member c will be decreased and the member d increased by the distance r' 2, which also has a resistance equal to one-half of arc GH. As both ends of the slider move simultaneously, it follows that when its extremities are adjusted to the position 2 then the bridge will balance and the sound in the telephone will cease. Applying this practically, let the bars $m\ n\ o\ p$ be laid off in suitable scale divisions from r to n and i' to p. The two telescopes i and i' being sighted on the object, the distant observer observes the galvanometer g'' and moves the slider $r\ r'$ along the bars $m\ n\ o\ p$, until the needle marks zero. The scale marked on the bars then shows an indication corresponding to the length of arc

GH. or the actual distances corresponding to such indications. This scale is on the same bar with the telescope, so that the distance indications are corrected automatically for the expression sin *ABC* in the formulas above.

To illustrate the practical application of the apparatus, the following instance may be given: The telescopes *i i'* mounted upon their arcs *k k'*, are given to two observers, who proceed to a skirmish line, or to any other advanced position, and, selecting a base line of predetermined length, train their instruments upon any desired point of an enemy's works or column. The fact that this is done may be indicated by a flag signal, or by one sent electrically to the rear over the bridge connections. The observer at the telephone *g'* may be supposed to be stationed in proximity to a battery of guns ready to open fire. As soon as the signal is sent that the telescopes are sighted the observer at the galvanometer adjusts the slider *r r'* until the needle stands at zero, and then determines the range from the marks on the bars *m n o p*, when the guns are laid accordingly.

But it is on board ship that the device obtains its greatest value, and a set of Lieutenant Fiske's apparatus is now nearing completion at the works of the Western Electric Company in this city, and will shortly be placed on board the U. S. S. *Baltimore*. Our illustration, Fig. 7, shows the range finder as it actually appears. The adjustable resistance wire is placed in the groove *H*, and the bridge wires *M N O P* are traversed by a slider *S* which carries a cross wire *W*. When the galvanometer, which is of the Weston pattern, stands at zero, the distance of the object sighted at can be read off directly on the scale *B*.

A large number of tests made with the instrument show that its accuracy is within a fraction of one per cent., which is much greater than that of the gun itself.

Military Notes.

MODERN DRILL AND TACTICS.

FEW officers have as yet realized what a vast revolution in the tactical instruction of the soldier on the continent has of late years taken place, or how rapidly time-honored customs and conventionalities are disappearing from the parade-ground. We Englishmen, despite all the Radical rubbish that is nowadays noisily hawked abroad, are true Conservatives, and in no country does an old institution or familiar piece of pedantry die more stubbornly. It is true that we occasionally break out in a fit of reform, and make a vast show of a freedom from prejudice, but the demonstration is only on the surface, and the experienced official laughs in his sleeve, and knows full well that, when the periodical hot fit is over, the deep waters will settle down once more and flow again with placid unconcern in their accustomed channels. In the Army our energetic attacks usually supervene on a similar outbreak abroad, and, therefore, when we hear of a new drill-book or alteration in tactics in France or Germany we may safely prognosticate a visit to these shores of the epidemic, yet may take consolation in the thought that the malady will with us assume a milder form, and will not only be less acute, but will make a shorter stay with us. Thus lately, when Germany and France have overhauled their drill regulations, we likewise follow suit, and alter not only our infantry, but our artillery drill also. Yet even while we do so, we are, as it were, amazed at our own recklessness, and would be afraid at our rashness were we not reassured by the undercurrent of feeling which whispers that after all it is only a display for the public benefit, and is not meant to be seriously carried out.

An excellent instance of our habits in these respects is afforded by the attitude we have taken up with regard to the new drill and formations of our infantry. Before the new "Infantry Drill" made its appearance, rumor was rife as to the vast alterations and changes that would there be manifested. We were told on high authority that in future the soldier would only be taught what was really useful on the battle-field, and would not be expected to burden his memory with what he would discard the moment he took the field. Yet a battalion on parade still presents the same general appearance as heretofore, and the old formations and evolutions, very slightly modified, still vigorously survive.

It is laid down that certain increased intervals are to be allowed to men in the ranks, but practically one never sees a battalion except drawn up shoulder to shoulder, as of yore, and the space occupied by it in line differs

only very slightly indeed (owing to the change as regards the officers) from what it was before. The new rules are there for a battalion when formed for manœuvre, but how often are they observed, except perhaps at Aldershot? or how often are they considered in estimating the space that is occupied by it? Our more practical neighbors, the Germans, have likewise brought out new rules suited to the looser formations that must in the future prevail, but how differently are they applied! Advantage in war is the only goal *they* are striving for, and therefore everything which is not found to result in a practical efficiency is sacrificed. Discipline is rigid, because men must learn, above all else, to subordinate themselves to the will of their leader. A quick, smart bearing is inculcated, and much store set by a soldier-like appearance, because a man must have a certain self-respect ere he can be trusted to thoroughly perform his trust, and because they have by experience arrived at the conclusion that the smartest soldier on parade is likewise the most reliable in action. How much it has cost them to discard some of their cherished evolutions may be judged from the fact that drill and niceties of line and dressing have ever been a hobby in their Army. Frederick the Great's favorite manœuvre depended for its success on an amount of accuracy in moving in column across country and wheeling correctly into line at the critical moment, which it is not too much to say we have never even imagined. His father had trained the Army with equal care, and laid the foundation on which the son was able to build his success, and his descendants have piously preserved his tradition until the present day. *In no army was greater store set by precision of movement, and nowhere was the pedantry of the martinet more rife. Yet, how these very sticklers for uniformity have shown themselves sufficiently liberal to rightly read the spirit of the age, and have set an example to the rest of the world in their bold departure from received traditions! A German battalion is no longer drawn up in line on parade at all!*

It is formed in a line of company columns, and the "Zug," which roughly corresponds to one of our half-companies, being the third part of the strong German company, is now recognized as the real unit of battle. The officer in command of a battalion no longer endeavors to direct or interfere with the action of his companies; he acts towards them, on the contrary, somewhat as a brigadier does towards the battalions that form the component parts of his command. Before they become engaged, therefore, he explains his views, sets a task to each, and leaves the carrying out of the scheme in detail to the responsibility of the officers in charge. In like manner they more or less delegate their authority to the "Zug" leaders, and so in the heat of action it happens that the men seek guidance from an officer who is really near them or among them, and who can, on the spur of the moment, act on his own responsibility with decision and quickness.

The battalion, even in its own cantonments and on its own parade-ground, is always in the very formation it would find itself in at the moment of combat, and the men consequently learn to look to no one but their "Zug" leader, and he in his turn learns to accept responsibility, and decide according to his own judgment in a crisis. Every one is taught to

use his wits, and to take an intelligent part in the day's doings. That the same people whose iron discipline and rigid drill formation were the admiration of Europe since a century ago should be thus capable of divorcing themselves from an obsolete standard is much to their credit. Can we, who boast of our independence of thought and robust liberalism, say as much? or are we still fettered by red tape and afraid to venture more than half way over the causeway which leads from the old to the new?—*United Service Gazette.*

THE ENGLISH ARMY IN 1889.

The year 1889, though it has been distinguished by no prominent feats of war, will, we venture to think, form a year of considerable interest to the student of the future. There have, it is true, been no epoch-making victories—no Sadowas, no Gravelottes, no Sedans—nor have any operations whatever between civilized foes attracted the attention of the world. And yet for us Englishmen, at any rate, much of first-rate importance has taken place, if not in the field, at any rate in the administration and organization of our forces. Peace has its triumphs as well as war, and the changes introduced in peace-time frequently are more vital to the interests of the British soldier than those which are brought about in the course of actual fighting. Our little wars but little affect any but those who have the good fortune to be engaged in them; but changes in administration, in organization, in equipment and armament, leave their impress on all alike, and have the most far-reaching and important results. Innovations in these latter directions should therefore claim the especial attention of our soldiers, and of such the twelve months just elapsed have been unusually prolific. Of lesser deeds of arms we have likewise had, perhaps, more than the annual share; but, although these have not been wanting in brilliancy and *éclat*, they have been only of secondary importance, and it is therefore of the events which captivate popular imagination to a smaller degree, and yet are of far greater moment to the Army, that we propose to speak first.

The year gone by will perhaps chiefly be remembered by the new "Infantry Drill," which bears its date. The new attack formations and the new organizations of our brigades and divisions had been for a long time expected, and had even been anticipated by some officers ere the official work appeared. Almost simultaneously most of the great Powers realized that the vast progress made in arms of precision necessitated some corresponding advance in tactical formations, and France, England and Germany well-nigh at the same moment, issued new regulations for the handling of their men. Our more eager and thorough-going reformers demanded even larger concessions than we have adopted. The "Zeitgeist" of modern war is everywhere strongly setting towards decentralization and individual responsibility. The unit on the battle-field is no longer the battalion nor even the double company. Our weak companies may perhaps sufficiently well supply it at present, but the tendency is to seek it in even smaller handfuls of men, and the direction of fire is rapidly becoming the point to which other considerations must give way. We have not gone quite as far

as the Germans. We still draw up our battalions in rigid lines. The complete leap to the front has been too much for our insular prejudices and conservative notions, but we have put forward at any rate one foot, and we may expect that a few years more will see the entire advance accomplished. Nor have our artillery been behind their brethren of the line. They too, in common with foreign gunners, have formulated a new drill-book and fresh regulations for the direction of fire, and they too have got rid of much that was mere ceremony and parade, and frankly accepted what modern requirements demand. Yet we can only receive what has as yet been done as an earnest of something more to come, for much that is obsolete and of secondary value still fills the pages of what should be an entirely practical text-book.

The year just departed has likewise witnessed the birth, or rather regeneration, of the new Army Service Corps. If hitherto the Commissariat and Transport Departments of the Service have hardly succeeded in quite maintaining their position socially amongst the other officers of the Army, it has been mainly due to the fact that they have not been combatant officers.

The fighting line must ever claim precedence over the perhaps not less useful, but certainly less distinguished "departmental" corps, and amongst soldiers a distinction will inevitably be made between them. Now, however, this reproach has been removed from the Army Service Corps, and with the additional advantages they enjoy, and the chances of staff employment open to them, officers of the best social position will doubtless flock to their ranks, and a prestige and *esprit de corps* will, in course of time, grow up amongst them. Indeed, it is a question whether the interests of the officers of the Army in general have not been sacrificed to those lucky enough to belong to the new corps. Something like one-half of the appointments available on the General Staff of the Army has been allotted to them, and this at the expense of many who have worked hard and gained Staff College certificates to qualify them. The Staff of the Army will now only be open to three classes of officers—those qualified by active service, those who have obtained the Staff College certificate, and the Army Service Corps. The surest and easiest way to get on the Staff will be from the latter; and, if the Staff College is to attract officers, we think it will only be logical to make a certificate from the College a passport to the Army Service Corps, otherwise the Staff College will scarcely continue to obtain the best men, and will degenerate into a refuge for officers ordered to bad stations or those who are too lazy for regimental duty.

A startling innovation also recently occurred when a civilian was appointed to succeed Colonel Maitland as head of the Ordnance Factories. An outsider proverbially sees most of the game, but fails to appreciate niceties and requirements unless he has been trained thereto all his life, and knows from practical experience the points to look to. The cry for a civilian element in our ordnance manufacturing departments was, it is now admitted, the outcome of individual pique and disappointment, to use no stronger terms, and recent failures in the guns produced by private firms have amply vindicated the character of our soldier experts. The Royal gun factories have come with flying colors out of the searching investiga-

tions that have been made, and the presence of a civilian head is a concession to agitation, which we may have cause to regret, and which will certainly not tend to improve the methods in vogue at Woolwich.

1889 will likewise be remembered as the first year in which machine-guns, mounted infantry and cyclists made their appearance amongst the recognized forces of the Crown. We have here taken steps in advance of all other nations. Germany disbelieves in both machine-guns and mounted infantry, and France has not accepted the new arms either as an integral part of the organization of its armies. The needs of our colonial empire place us, however, in a different position to other nations, and in our continual small wars we have opportunities for deriving the full benefit from the new arms. We venture to think the rage for machine-gun fire has, however, well-nigh spent itself, and most officers are beginning to feel more confidence in the fire effect which can be produced by the magazine rifle. The introduction of this weapon will mark the close of 1889, and the small-bore rifle will prove one of the most important changes in armament that even this nineteenth century has witnessed. A bullet which has only the diameter of an ordinary cedar pencil would indeed appear absurd to the officers accustomed to the old "Brown Bess" or the Enfield. Yet the new projectile will suffice to render a man *hors de combat*, and will enable far more ammunition to be carried than heretofore. Indeed, the magazine system and the small-bore must go together, and it is the latter which has rendered the former possible. The difficulty caused by the stripping of the bullet has, we believe, at length been satisfactorily overcome, and we are assured that next drill season will find the troops at Aldershot handling the new rifle. Before we leave this subject we must also notice the valuable sights which have been invented by Major Lewes. They will, we feel convinced, materially assist the fire of our soldiers. In war the target is usually so wide that the chief difficulty is to get the men to give correct elevation; and Lewes' sights, by doing away with the difficulties of "fine" and "full" sights, materially simplify the task. We believe the same principle might with advantage be applied to the method of sighting our field guns too.

Another subject that has largely occupied public attention has been the inevitable introduction of a smokeless powder. Lord Wolseley assured us the other day that he believed in it, and that the coming spring would see it in practical use in our Service. Even if it do not make its *début* quite so early as that, we may confidently expect to see it in every-day use ere many months elapse. The times are ripe for it. Neither magazine rifles nor machine-guns can have fair scope until they are charged with it, and nowadays, when such a necessity arises, we may safely predict that the skill of the age will be equal to the occasion. Quick-firing guns for field artillery loom in the future, but we cannot hope to see them on the battle-field till the powder question is set at rest.

The year past will be remarkable, also, in that in it the first murmurs against the present high velocity field-guns began to make themselves openly heard. There is no concealing the fact that the 12-pounder shrapnel has not by any means realized the anticipations that were formed of it. It has

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been proved, moreover, during the past twelve months, by the very best authority, namely, the Commandant of the School of Gunnery, that the high velocity of the 12-pounder is not only not necessary, but is positively detrimental to its effect with shrapnel. That it was intensely detrimental to the carriage and service of the gun, owing to the enormous recoil engendered, has been recognized all along, but it was a revelation to most people to learn that it tended to defeat the very object with which it was introduced. A slightly lower velocity would obviate many of the present difficulties encountered, and would improve the shooting of the piece.—*United Service Gazette.*

ELSWICK ARSENAL AND SHIP-YARD.

I.

QUICK-FIRING GUNS.

The application of the "quick-firing" principle to guns which may fairly be classed as armor-piercing, will probably do more to govern the tactics of naval commanders in any war which may arise in the immediate—if not the distant—future, than any other phase of production of warlike materiel. For service on shore it has been said that "by the aid of quick-firing guns and the position-finder we are enabled to carry out the ideal system of defense, viz., few guns in dispersed emplacements concealed by natural features. This system has long been advocated by Sir Andrew Clarke, and it is difficult to see how any further opposition can consistently be offered to it."* For the protection of mine fields the quick-firing gun would be invaluable; indeed, the authority we have just quoted considers the operations of sweeping, creeping, or countermining might be rendered absolutely impossible by the fire of quick-firing guns. "The only reliable defense against an assailant's inshore squadron," continues Captain Stone, "will be the extensive employment of quick-firing guns of sufficient calibre, not merely to annihilate landing or boarding parties, or to send a torpedo boat to the bottom, but equal to the task of putting a gunboat *hors de combat*, and either wrecking her or making it possible for the active harbor defense to capture her."

The use of shells charged with explosives more powerful than gunpowder has given additional importance to these projectiles of smaller natures, and with the increased development of higher explosives, a corresponding development of shell fire may be anticipated. This has already taken effect in the science of war-ship design, and naval constructors are now looking with less favor on large unarmored surfaces, and indeed the older battle-ships with comparatively thin armor, which a year or so ago were considered all but obsolete, are now considered as of some importance in view of the development of quick-firing guns and high explosive shells.

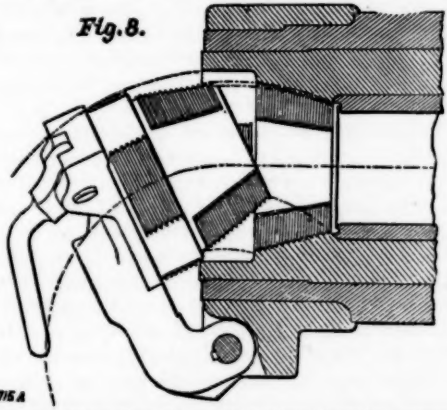
The part which the Elswick firm has taken in the introduction of quick-firing guns is well-known.

*Captain F. Gleadowe Stone, R. E. Lecture at the Royal United Service Institution, read 18th January, 1889.

This weapon is the 4.7 in. simultaneous loading breech-loading gun, calibre 4.724 in., or 12 cm., firing a shell of 45 lbs., with 12 lbs. of P. or S. powder. The gun is entirely of steel, its total length 16 ft. 2 in.; length of bore, 40 calibres; and weight, 41 cwt.

The breech is closed on the interrupted screw system, and to render the closing and opening more easy and rapid, the breech-block is formed in two steps, both of which have portions of an interrupted screw on their surfaces, the threads on one step standing longitudinally opposite to the blank spaces on the other. The breech-block swings rapidly into place, and is secured by a small turning movement. The gun is fired by electricity. In the base of the cartridge case is screwed an electric primer, against which presses an insulated steel pin, carried in the axis of the breech-block. This pin is in communication with the electric wires, which carry the current to fire the primer, only when the breech-block is closed, and secured by turning the lever downwards against the rear of the block. The circuit is closed, and

Fig. 8.



the charge fired by pulling the trigger of a pistol handle, arranged in a convenient position close to the sights. In case of the failure of the electrical firing gear each gun is also fitted with a percussion lock; the electric primer in the base of the cartridge is replaced by a percussion primer of the same form, and the steel pin, which in the former case supplied the electrical contact, now serves as a firing needle. The percussion firing gear also has a safety appliance to prevent the charge being fired till the breech is closed and locked. In this manner all danger of accidental discharge is avoided, and complete security gained. The gun is mounted in a rocking slide, in which it can only move in the direction of recoil. Fixed to this rocking slide is a combined spring and hydraulic buffer arrangement, which serves both to check the recoil and also to run the gun out again after discharge. An arm projects downwards from the breech of the gun and is attached by a nut to the ram of the hydraulic recoil press. The gun itself has no trunnions, but slides in the rocking slide, to the extent of the recoil, which is only 9 in.

The action on firing is as follows: The gun slides back, within the rock-

ing slide, the recoil being transmitted by the arm to the recoil press, where it is absorbed; the spring in the second cylinder is at the same time compressed. As soon as the recoil is absorbed the spring begins to act, and pushes the gun back, along the rocking slide to its first position. The lower part of the mounting is formed by a strong transverse steel plate or transom, which rigidly supports the mounting, and at the same time forms a substantial protection or shield to the base of the structure and the men working behind it. Above this is a lighter steel shield, covering the detachment from rifle fire, the upper portion being arranged to hinge back, so as to admit of a more extended view when using the gun at night. The under carriage is carried on live rollers running on a bed-plate, so as to insure great freedom of training, which is effected either by means of a shoulder-piece rigidly connected to the under carriage, or by a worm-wheel training gear, worked by a hand-wheel at the sighting or firing position. A clamp on the bed plate is provided, so as to fix the gun at any desired point of training. The elevation and depression of the gun require very little power, as the gun and working slide are accurately balanced on their trunnion bearings. The rack and pinion gear for this purpose is worked by an elevating hand-wheel close to the training wheel, and thus also at the sighting or firing position.

This description applies equally to the quick-firing guns and mountings of the larger natures. On account, however, of the increased weight of the ammunition, the cartridge and projectile are often handled separately.

The quick-firing gun is an extension, or at any rate the outcome, of the smaller machine guns of the Hotchkiss, Nordenfeldt, and Gardner type. The Hotchkiss are, however, now made up to 3.94 in. bore, and throw a projectile of 33 lbs. This class of gun is useful against torpedo boats and unarmored structures, but could hardly be used with effect upon any protection which could be dignified with the name of armor. It will be seen that the quick-firing guns would play a very important part in encounters between battle-ships, for those of the most modern types of design have important positions open to the attacks of these guns, even those not of the heaviest calibre.

The ideal gun has been described as that which possesses high penetrative power, and a capacity for firing shells with the most effective bursting charges, whilst it could, when required, be fired with great rapidity to repel a flotilla of attacking vessels. A glance at the tables will show that these points are secured with the weapons we are now considering. With the 4.7-in., 5.5-in., and 6-in. guns the projectiles are 45 lbs., 70 lbs., and 100 lbs., or even 120 lbs. The rate of fire has been found in actual practice to be from six rounds per minute with the 6-in. gun to fourteen rounds per minute with the 4.7-in. gun. If we compare the rate of fire of these guns with that obtained from the ordinary breech-loading guns in the Service we find that some experiments carried out on shipboard by the Admiralty gave ten rounds in the 47 seconds from 4.7-in. quick-firing gun, whilst the 5-in. ordinary breechloader took 5 minutes 7 seconds to discharge the same number of rounds.

It is unnecessary to dwell on the advantages of rapidity of fire in action.

It was this very feature which contributed so much in times past to British naval victories; although then the result was achieved by the superior hardihood and address of our seamen, who could serve their guns so much quicker than could their enemies. In this epoch of mechanism, however, we must depend on the brains of our inventors, rather than the muscles and nerves of our seamen, to give like results; although we by no means wish to say that the day for nerve and muscle is past. Indeed the value of cool and disciplined courage was never more apparent in the past than it will be in the next great naval war. Hardly any superiority in personnel could compensate for the disadvantage in materiel of a gun requiring over five minutes to do what another would accomplish in 47 seconds, and it is obvious therefore that we must have quick-firing guns in spite of minor objections that may be raised against them, such as difficulties on account of smoke—when smokeless powder is not used—or in getting the ammunition to the gun with sufficient rapidity. The Admiralty have not been slow to acknowledge the advantages of the new principle, and large orders for the navy for 4.7-in. and 6-in. guns have been given to the Messrs. Armstrong, the results of which are very plainly visible just now in the Elswick shops.

We have already described the mechanism of this gun, but there are some points in the design put forward by the makers to which attention may be called. By the interrupted screw system of breech-closing two advantages are secured. Firstly, the action of opening and closing the breech is much simplified, as the breech-piece need not be withdrawn before hinging away; and secondly, the coned shape of the breech-screw enables it to take hold, not only of the inner surface of the metal of the breech-piece or jacket, but also distributes the engagement, and therefore the strain and support, throughout a considerable thickness of the gun. The breech-screw is further arranged so that the threads of the smaller end of the cone correspond longitudinally with the interrupted spaces of the larger end, and *vice versa*, so that the strain and support are also distributed throughout the entire circumference of the breech-screw, instead of, as formerly, half the circumference being lost by the interrupted spaces. In the mounting the labor of training and elevating is reduced to a minimum. A shoulder clutch and a pistol trigger are provided, and the piece can be handled by a single man with the same ease as the small Hotchkiss 6-pounder. The recoil is so arranged that the man aiming can alter the position of the gun up to the very instant of firing, and also keep control of the gun working and sighting gear during the actual discharge, or throughout any number of rounds. Naval officers will not be slow to appreciate the advantage secured by this arrangement under the varying conditions of actions at sea.

The carriage allows the gun to recoil always in the line of fire, and the fixings and deck are thus to a large extent relieved of the ordinary recoil strains. After discharge the gun returns instantly and automatically to firing position. A substantial shield of steel, 4¼ in. thick, is provided in front, and protection is thus given to the men serving the gun.

In the ammunition the principle of the ordinary rifle cartridge has been

extended to these guns; the projectile and powder charge forming only one piece. The powder is put into a solid-drawn brass cartridge, in the mouth of which the projectile is fixed, so that the whole can be handled together. A great saving of time and labor is thus effected, and the incidental advantages of increased safety, and the immunity of the powder from climatic deterioration are also secured. To the fact of the projectile and charge being thus placed in the gun at the same time is due the title of "simultaneous loading" which has been applied to these guns. To the improvement in the ammunition the quick rate of firing is very largely to be attributed. The solid-drawn cartridge cases, owing to their great size, have presented difficulties in manufacture, but these have been now surmounted, and it is found in practice that they can be fired as many as ten times over without need of reforming.

In apportioning the ammunition for these guns, penetrating shell will constitute a very large proportion of the whole equipment.

Side by side with the improvement in the guns and mountings have gone new discoveries and developments of powder. The Chilworth Powder Company are now manufacturing a powder specially designed for use in these guns. It is practically smokeless—an inestimable advantage where rapid firing is an essential, and the hanging smoke which makes good aiming impossible is thus almost entirely avoided. The charge of this Chilworth powder is very much less than that of black prismatic required to produce the same effects. The pressures obtained with it are very uniform, and the velocities very high, ranging up to 2,450 ft. or 2,500 ft. per second.

The following table—table V.—gives the average results obtained with these guns. Some of the data have already been given, but it will be found convenient for reference to put it in this form:

TABLE V.

Nature and Weight of Gun.	Rounds per minute.	Weight and Nature of Charge.	Weight of Projectile in Pounds.	Maximum Pressure in Chamber in Tons.	Muzzle Velocity in Feet per Second.	Total Energy in Foot-Tons.	Penetration of Wrought-Iron Plate in inches.
		lb.					
4.724-in. (41 cwt.)	12	12 P.	45	15.0	1850	1068	8.5
	12	12 S.	45	15.5	2250	1580	10.7
5.5-in. (58 cwt.)	9	34 B. P.	70	14.0	2100	2141	11.6
	9	25 S.	70	15.0	2215	2381	12.2
6-in. (110 cwt.)	6	60 B. P.	100	15.0	2260	3542	14.2
	6	38 S.	100	16.5	3340	3797	14.7

P.=Pebble. S.=Smokeless. B.P.=Brown prismatic.

These results are sufficiently remarkable; but it is claimed that if they are translated into the conditions of actual warfare, they become still more striking. One of the principal reasons that led to so large an employment of quick-firing guns in naval services was no doubt the necessity of being able to cope instantly and effectually with the attack of torpedo boats.

The very high rate of speed possessed by the modern torpedo boat, whilst increasing its powers of offense, has at the same time diminished the risk of its being hit. It not only remains a much shorter time exposed to fire when making its attack, but its rapid motion necessitates a great alteration of aim between each round fired at it, and a corresponding likelihood of error. Suppose a torpedo-boat to be sighted at a distance of 1,500 yards by a war vessel having a broadside armament of three Service 5-in. breech-loading guns, each capable of firing two rounds a minute. It is estimated that the torpedo-boat could not hope to discharge a torpedo with much certainty at a longer range than 200 yards; and would, therefore, have to traverse a distance of 1,300 yards under fire before she could begin the attack. Assuming the speed of a first-class torpedo-boat to be twenty knots an hour, which is certainly a high figure, the time occupied in traversing 1,300 yards would be, roughly speaking, two minutes. The war vessel, therefore, armed with a broadside of three 5-in. guns, each firing two rounds per minute, would be able to discharge twelve shots at the torpedo-boat before there was a chance of her being torpedoed. If, however, in lieu of the three Service 5-in. guns, she was armed with three of the improved Armstrong 4.7-in. 45-pounders, she could in the same time fire no less than seventy-two shots, each gun being capable of firing twelve shots a minute.

Besides the advantage of being able to fire six times as often, there is the collateral one of a very slight alteration of aim being required in one case and a very considerable one in the other. Between each round of the 5-in. breech-loading gun, the torpedo-boat would move 340 yards, and the aim would have to be correspondingly altered; while between the rounds of the 45-pounder gun, she would only move thirty yards, and a very slight alteration would be required, and a successful shot could thus be instantly repeated.

But although it was the torpedo-boat which first gave such an impetus to the introduction of the quick-firing gun, the weapon has been so largely developed in the progress of time that it now holds a much higher position and cannot fail to play an important part in encounters between important war vessels in the future.

Comment and Criticism.

I.

"Mountain Artillery."

Major Joseph P. Sanger, Inspector General, U. S. A.

DURING the sessions of the Artillery Council, 1887, this subject was very carefully considered and commended to the notice and action of the President. In April, 1889, per G. O. 38, Headquarters of the Army, Battery C, 1st Artillery, was designated as a mountain battery. For reasons which have not been made public, but which, no doubt, fully justified the action taken, this battery was dismounted in September following, and mountain artillery, as a branch of our artillery service, disappeared from view. With the hope and expectation that it will soon reappear to complete the various branches of this important arm, I submit the following reflections, although no longer connected with the artillery service.

In the last number of the JOURNAL Lieutenant Parkhurst, of the 4th Artillery, has called attention to this subject, and given some information respecting the object and character of mountain artillery. Let us hope that his efforts to revive interest in a topic of so much importance to the artillery may not be in vain, but that during the present *eclipse*, artillery officers may, by careful consideration, be prepared to give intelligent direction to the new luminary whenever it shall reappear above the military horizon. In common with a very large majority of our artillery officers I have never served with mountain artillery; nevertheless I have been for many years an interested student of the subject, and with the exception of the Spanish batteries, have had the good fortune to see mountain batteries of all foreign armies in which it is a distinct branch of the artillery service.

Whatever the experience of other countries may have been, it cannot be denied that mountain artillery is of considerable importance to us. At no time during the past twenty-five years could we have dispensed with it, had it been an existent branch of the arm, and while the probabilities of its frequent use are diminishing with the decreased activity of our warlike Indians, there will no doubt be occasions in future when its presence will be needed to co-operate with the other arms in adjusting difficulties and preserving the peace. Mountain artillery has no double rôle to enact, and every attempt to make it as useful on the plains as in the mountains has resulted unfavorably. Its only mission is mountain warfare, and when this fact has been kept pointedly in view, it has fully satisfied all expectations as to its capacity and value. In this country artillery troops, in recent years, save those stationed along the Pacific Coast, have practically been excluded from all participation in the military operations of the West. This has not, however, prevented the employment of guns upon various occasions, and this has led to the belief that the weapons of the arm can be handled as readily by either the infantry or cavalry as by the artillery, and that the latter have no professional field outside of a sea-coast fortification or the field batteries annexed thereto. Upon just what theory the military authorities have proceeded to shut out the artillery, and turn their field duties over to any one willing to perform them, it is difficult to say, but that such administration has injured the artillery and has not en-

hanced the conduct of military operations, every impartial judge will admit. "Every man to his trade," is a truism as applicable to professional men as to those of other vocations, and but little reliance can be placed on services rendered hap-hazard in one branch by those whose experience has been gained in another. The idea that soldiers can pass indifferently from one arm to another and render efficient service on the battle-field has long since been rejected as fallacious, and mere ability to ornament a parade ground or perform some prescribed drill manœuvre is not now received as indicating the ability to *direct* troops skillfully when brought into contact with the enemy. Hence, while I do not mean to disparage in any way such services as may have been rendered by makeshift batteries in the hands of any one picked up for the occasion during the past twenty-five years, I am satisfied that the batteries and the services they performed would have been of very great value had they been rendered by the artillery, whose skill, interest and professional spirit and reputation would have been aroused and involved in the result. I do not believe that any officer can command with equal skill all arms of the Service unless he has been trained by experience to do so. Every one knows how long after he has been transferred to the mounted service the habits and peculiarities of a foot soldier will cling to him and, *vice versa*, and how these frequently become a serious drawback to him and to those associated with him. This is the common experience and has resulted in some armies in a requirement that all divisional generals, or those who command the three arms united, shall serve in each long enough to have acquired the necessary experience. Hence, I say, if there be any probability that artillery can ever again serve a useful purpose in this country by taking part in military operations conducted on the plains or in a mountainous region, such services should be rendered by the artillery personnel, equipped and instructed according to the best experience of the arm.

My first view of mountain artillery was in India, in the winter of 1876, where I had an opportunity of witnessing the drill and noting the equipment of some of the batteries of the Punjaub stationed along the north-western frontier. My next experience in the following spring was with the Russian mountain batteries serving in the Army of the Caucasus, and these I saw again at the Russian camp of manœuvre near St. Petersburgh in the month of August following, where they were on exhibition as batteries, models after which all other mountain batteries were to pattern. Their training was excellent, the guns being unpacked, placed in battery and fired in 48 seconds. Previous to this I had seen one of the mountain batteries of Italy, and subsequently the material of the Austrian batteries. Germany and France do not maintain mountain artillery on the continent as a distinct branch, and the mountain batteries of minor States are imitations of their more powerful neighbors. As a result of my observation and study, I am convinced, as far as one ought to be who has had no practical experience, that no attempt should be made to equip mountain batteries for any other purpose than service in a rough hilly country, and that their outfit is primarily for that kind of service, and nothing else. The idea that such batteries may be called on for service on the plains, should not be permitted to modify to any extent their proper equipment. I assume this as a fundamental principle by which I think the correctness of all theories of organization, equipment and instruction should be tested.

Not so, however, those who have adopted the general utility view, and who think the equipment of the batteries should be equal to all emergencies. This difference of opinion has caused a corresponding difference in the armament and equipment of mountain artillery, and in my opinion retarded its steady development.

THE GUN.—We have no mountain gun at all comparable with those of foreign armories or which would produce much effect in mountain warfare. The Hotchkiss mountain gun and the 12 pdr. mountain howitzer are neither of them worth a rush for

the kind of service required; the first because of its small calibre, and the second from lack of power; but if I had to choose between them I should select the mountain howitzer or what would answer better in some respects the 24 pdr. Coehorn mortar. I may be permitted to remark in this connection that in its day our mountain artillery equipment was second to that of no other country, and except as to the materials of which it is made may be taken even now as an appropriate point of departure in devising a new system. The English jointed gun is the direct offspring of the utility theory, to which reference has been made, the object in this case being to produce a gun which will be effective not only in a mountainous, but in an open or level country. It is jointed because it is necessary to distribute its weight (400 lbs). In a mountain gun it has very high power as well as great weight, and in both respects is much beyond necessary or even desirable limits.

I think the best experience has shown that in mountain warfare, one mile may be taken as the average extreme fighting range. This results from the nature of the country, and the fact that the cover is usually such as to warrant a much closer approach; consequently a high power gun is not needed, Neither is a gun of complex mechanism, and especially one which like the jointed gun, may be placed *hors de combat* by a serious accident to either of the animals carrying the parts.

The needed attributes are simplicity of mechanism, a weight not to exceed 215 lbs., a length not to exceed 15 calibres, and power enough to render a shrapnel destructive at a distance of one mile.

As moral effect is of great consequence, the tendency is towards larger calibres by means of which projectiles of not less than 12 lbs. weight may be used.

THE CARRIAGE.—Opinion is divided in respect to the character of the carriage; whether or not it should have wheels is the question. Those who advocate discarding the wheels wish to rid the outfit entirely of everything which will reduce the weight, and confine the use of the battery to mountain warfare. I am in sympathy to some extent with this view, and would be entirely so were it not that I think any expedient by which the labor of the animals can be made available at all times is valuable, and this is the principal function of the wheels. In a very difficult country during inclement weather the animals are liable to chafes and to ugly sores which, for the time being, render them unserviceable as pack animals. By putting them in shafts their injuries can be treated without difficulty and speedy cures effected. Wheels have no other property that occurs to me worth mentioning, and I am not sure that even for this purpose they should be retained when we consider how much the outfit would be simplified by running them. The carriage should be of steel with some one of the numerous devices for taking up the strain of recoil, and should be provided with apparatus for giving an elevation of 35°. For this purpose the device used by the English would answer as well as any other. The carriage should permit a depression of 20°. There should be no limber even if the carriage be mounted on wheels, as the shafts can be readily attached to the trail. The length of the axle should not exceed 30 inches, or the weight of the carriage without wheels 200 lbs.

PACK SADDLES.—The frames should be of steel and adapted to the various objects, which will be understood by a glance at any drawing of mountain artillery to which the reader may have access. The weight should not exceed 50 lbs. The points to be observed are stability of the load, which should not exceed 275 lbs. per animal, the removal of all pressure from the backbone, and an entire absence of cinching or tight girthing.

The saddles should be so thoroughly padded as to render the use of blankets or other pads unnecessary, and should be provided with breast-band and crupper to prevent shifting.

Packers who are in the habit of securing their saddles by the use of cinch-straps will not approve of either the crupper or breast strap, preferring to rely on their ability to secure the saddle by squeezing the chest and belly of the animal until it squeals and is hardly able to breathe; but the unprejudiced officer will try them in order to do away if possible with this barbarous custom, if for no other reason.

ANIMALS.—If the carriages have wheels, four animals per gun will be needed, to-wit: one for the piece, one for the carriage, one for the wheels, and one for the two ammunition boxes, which should accompany the piece. The officers and chiefs of pieces should be mounted, and such other members of the battery as deserve to be, as, for example, the 1st sergeant, quartermaster sergeant, stable sergeant, farriers, saddlers and trumpeters. The number of animals will therefore depend on the number of pieces in the battery and who it may be decided to mount.

Whether they should be horses or mules is a question. The Russians use horses, while the English and others use mules; both have been used in this country, though how they compared, I have not the means of knowing. One of the objections to horses is their height as relates to their weight. For ease in manœuvring no animal should be above 14 hands, and if they are strong and well built they need not exceed 13½. One of the experiments which might well be tried in this country is a comparison of the respective merits of horses and pack-mules for mountain artillery service, which it should be remembered differs in several important particulars from the service of a pack-train.

UNIFORMS.—No better dress for mountain work can be found than the tunic, knickerbockers, leggings and shoes. Each soldier should carry a revolver and be instructed in its use; no other side-arms are necessary.

INSTRUCTION.—One of the first objects to engage the attention of our artillery officers will be a suitable manual of instruction, embracing the drill, the details of the equipments and such suggestions concerning mountain warfare as may be useful. Such manœuvres as I have seen have been very simple, the principal object being to practice the men in packing and unpacking, in selecting good positions and in climbing and marching over rough mountainous ground. These exercises should not take place on the level, and this suggests the appropriate stations of the mountain batteries. I do not concur with Lieutenant Parkhurst in regard to Fort Riley; the ground about that post, while undulating, is by no means suitable for such purposes. West Point on the Hudson, is a far better post for the commencement of operations. As soon as they are equipped the batteries should be transferred to Arizona, New Mexico, or to any other region which promises employment and is adapted to their proper training. This, if properly conducted will soon open to the artillery a field which has been closed against them for many years: one they should hasten to re-occupy in the confident belief that by so doing they will greatly promote the influence and usefulness of the arm.

II.

"New Powders and Guns."

Major George W. McKee, Ordnance Dept., U. S. A.

IN the article by Mr. J. A. Longridge (*Engineering, London*), reprinted in the JOURNAL OF THE MILITARY SERVICE INSTITUTION, January, 1890, and anent which a note was sent me by the Editor of the latter publication, I had hoped to find a discussion by such an able authority on the subject of smokeless powders in general; but he confines his remarks to the Chilworth powder, in comparison with two others, and devotes most of his article to wire as the proper material to be used in the construction of guns.

As regards the portion of his article, referring to the Navy, I feel great diffidence in making any remarks whatever, as I am ignorant of many things appertaining to the nautical profession. I would, however, think that Admiral Mayne was right in his "deprecation of monster guns afloat." It would occur to me, as a landsman, that a very fleet vessel—one that could fight, or run away, as the occasion required, and carrying some long-range, rapid-firing guns of moderate calibre—would be the kind of man-of-war capable of inflicting great damage anywhere. Such guns could be used with the powders we are now familiar with until we perfect a high-explosive for shells, and then the necessity for heavy guns, on sea or land, will be obviated, As to the ultimate success of this high explosive for shells it is believed there is no doubt whatever. It is simply a question of time and trial, and it is thought the time will be brief. We will, with a comparatively small-calibre gun, be able to safely deliver an enormous energy at the objective point.

It is understood that I refer to high explosives in shells that are propelled from guns capable of giving them *range* and *energy*. The so-called Zalinski Pneumatic Dynamite Gun can give neither the one nor the other, and is, in my opinion, one of the greatest military humbugs of the age. Any enterprising captain of a man-of-war, even if he be equipped only with Hotchkiss' revolving cannon, will have a very easy job on his hands should he happen upon a vessel armed with these pneumatic devices. And what possible chance would such a vessel stand with another like the *Piemonte* (to quote Mr. Longridge), "pouring out a storm of twenty-four projectiles of 100 lbs. each, and thirty-six projectiles of 45 lbs. each, or sixty projectiles per minute, any one of which, by a fair hit would put one of the large guns out of action"?

And those pneumatic guns mounted on land, having no range, and, from their great length, not being able to be protected, will, when attacked by modern guns, be destroyed with ease without inflicting the slightest injury upon any enemy of intelligence.

Coming now to Mr. Longridge's calculations and summary of results as regards the powders, the case may be briefly stated as follows: The 6-inch quick-firing gun, with a charge of 38 lbs. of Chilworth powder and a projectile of 100 lbs., gives a muzzle velocity of 2300 feet per second, while the Service 6-inch gun, with the same projectile, and a charge of 55 lbs. of brown powder gives only 1970 feet per second. The lengths, in calibres, of these guns are respectively:

6-inch Quick-firing.....40
6-inch Service.....26

Here it is seen that 38 lbs. of Chilworth powder, with the opportunity of sustaining a pressure through an additional seven feet of bore, will give a greater energy than 55 lbs. of brown powder in the Service gun—the calibres and projectiles being the same. But, with an equal length of bore, the 55 lbs. of brown powder in the Service gun give a calculated muzzle velocity of 2340 feet—exceeding the 38 lbs. of Chilworth by only 40 feet. Hence it appears that the Chilworth is much stronger than the brown, but what its pressures were we are not permitted to know—Lord Armstrong speaking of them only as "very permissible pressures." Mr. Longridge presumes that the pressure was about 15 to 17 tons per square inch, and states that the pressure of 38 lbs. of pebble powder would be about 28 tons per square inch.

Mr. Longridge says that 38 lbs. of pebble powder, in a 6-inch gun of 40 calibres in length, would give a muzzle velocity of at least 2600 feet per second. As nothing is said to the contrary, he means, of course, the same 6-inch Service gun extended to 40 calibres but with the original diameters through base line and reinforce. He states the converse of the proposition as follows: "What would be the length of a 6-inch gun to give the same velocity with 38 lbs. of pebble as would be given by the new

quick-firing 6-inch gun with the same charge of Chilworth powder?" The reply to this is 22½ calibres. Consequently the respective lengths of the guns would be;

	ft.
New gun with Chilworth powder.....	20
Ordnance gun with pebble.....	11¼

This is all very well, provided the gun, as at present constructed, will be able to live a reasonable number of rounds while sustaining a pressure of 28 tons per square inch. I observe that the Ordnance Committee deems it wise to use a comparatively mild powder as, although the Chilworth is much stronger than the brown, it certainly, if Mr. Longridge's presumption about the "permissible pressures" is correct, is much milder than the pebble powder.

As Mr. Longridge justly remarks in this immediate connection: "What is a 'permissible pressure' depends solely on the strength of the gun." And he states: "It is perfectly certain that by the adoption of wire a gun may be made which will be less strained by an internal pressure of 28 tons than a forged steel gun of the same calibre with a pressure of 17 tons."

This is a consummation wished by everybody and will be welcomed everywhere where it is satisfactorily shown, by thorough tests, that the wire will do what Mr. Longridge claims for it. I was present at Frankford Arsenal when the Woodbridge 10-inch wire gun at the tenth round developed a crack, or opening of the wire, on the exterior just above the seat of the charge. I have always thought that this initial rupture, or separation, was due to what, for want of a better term, might be called Tangential Vibration, resulting from the great Tangential or Circumferential strain. It occurred just where the tangential strain would be at its maximum and was not, in my opinion, due to the longitudinal strain, as is generally supposed. I cannot enter into any details of this discussion at present, and I will therefore condense what I have to say into as few words as possible.

The superincumbent wire about the excellent tube in that 10-inch Woodbridge gun certainly ought, whether the brazing were defective or not, as I understand is alleged by Dr. Woodbridge, to have afforded enough support to the tube to have enabled it to overcome the longitudinal strains to which it was subjected. These strains can readily be calculated from the record, not one of the pressures, up to, and including, the tenth round, exceeding 19 English tons.

If a section or log—say of a gum-tree for instance—with a tough, knotty fibre, growing spirally around the heart of the tree, as is often seen, be bored out through the heart so as to form a hollow cylinder, and the interior filled with wax or subjected to pressure from a piston, we will have a good illustration of a tangential strain on a wire gun. The tangential effort to split the log from end to end will follow the lines of least resistance, and it will be seen that where the tough, knotty fibre runs around or envelopes the wooden cylinder, the fracture will follow the inclination of the knot. Thus, if the inclination, at some point, be between 45° and the perpendicular to the axis, a rupture or opening will take place along that line, and the tendency of the effort will be to separate the long cylinder into two smaller ones instead of splitting it from one end to the other. Any one observing this phenomenon of rupture, and not being acquainted with the physical constitution of the log before the fact, would very naturally conclude that it had been separated into two cylinders, somewhere in the midst, by a force pulling it from end to end—in other words by a longitudinal strain.

A factitious case of a powerful knotty fibre around an axis occurs exactly where wire is wound around a tube. In this latter instance we have *all* knotty fibre, or wire, to sustain the tube and aid in the work of resisting the various strains. And in a wire gun constructed like the Woodbridge 10-inch (for that is the gun we are considering) the

initial rupture, or opening, will commence, I believe, along a line of exterior section, perpendicular or inclined to the axis, which is located on the circumference of least resistance to the tangential strain, and its vibration.

Although the powder (Dupont's Hexagonal) was not so strong as the English Pebble, nevertheless it would appear that it was sufficiently *brisant* to prevent the propagation of molecular disturbance to the outer layers of wire in time to support the inner layers and tube. These latter were doing all the work and the outer layers were simply subjected to a tremendous vibration, resulting mainly from the tangential strain, which very soon caused a separation, or opening, of the wire at the very place where it was to be expected. This opening progressed, of course, at subsequent rounds, and when it approached the tube, it gave the comparatively weak longitudinal strain an opportunity to assist in breaking the gun.

But, in this particular instance, the brazing of the wire may have tended to alter its physical properties, and to abnormally increase the density and diminish the elasticity of the system—all of which effects would have militated against the strength of the gun. The wire must be so disposed as to attain the rigidity and homogeneity necessary for the passage of the wave front to the surface in time to enable the whole system to work simultaneously. Such a disposition, it is believed, did not obtain in the late Woodbridge 10-inch gun.

The mechanical difficulty attending the enveloping of a tube with wire so as to afford a rigid and homogeneous body capable of quickly propagating molecular disturbance, must not therefore be lost sight of in this method of construction. The greater the radius the greater will be the chances for faulty construction, and the percentage of successful small-calibred wire guns, it is thought, will be much greater than that of similar guns of large calibre.

In all of the above it is understood that I am in no way prepossessed against wire, and trust that Mr. Longridge, Dr. Woodbridge, or some other scientist, may perfect it in its application to gun construction. I simply state empirical facts that have come under my observation, and from them present my deductions, which may be erroneous.

Captain James M. Ingalls, 1st Artillery, U. S. A.

Mr. Longridge sums up by saying: "I am satisfied that a 12-inch gun about 25 feet long and weighing about 50 to 60 tons, and mounted on a disappearing carriage, is the heaviest gun that ought to be put on board a battle-ship. Such a gun, fired with a powder of about one cubic inch grain, would give to a 1500 lbs. projectile a velocity of 1830 f. s. at 1000 yards from the muzzle, and this would have the same energy per inch of circumference, and consequently the same power of penetration as the 1800 lbs. projectile fired from the 110-ton guns of the *Victoria*."

The gun thus described would be among the most powerful armor-piercing guns yet manufactured, ranking in this respect with the 40-cm. gun furnished the Italian Government by Krupp, for the defense of Spezzia. It would not only have *greater* power of penetration than the 110-ton at 1000 yards, but at 10,000 yards as well, or, indeed, at any practicable range whatever. Its muzzle velocity would be 1915 f. s.; and, for any angle of elevation in direct fire, its trajectory would be flatter (and therefore its range greater) than that of any gun in existence. Such a gun would naturally displace all other kinds of heavy guns for battle-ships, could it be procured.

It is possible that a wire-wound gun of the future may be able, with a 25-calibre bore, to give to a projectile *5 calibres in length*, a muzzle velocity of 1915 f. s. with safety to the gun. Of this no one is perhaps better able to judge than Mr. Longridge himself, who has made this kind of gun a special study.

The writer states that it is practically useless to fire against armor at a greater distance than 1500 yards. He makes this statement without reservation; but he can hardly mean to apply it to the fire of heavy guns from shore batteries against armored ships. There are guns now mounted which can penetrate almost any armor afloat at two or three times that distance, with at least an even chance of hitting. Take, for example, the guns at Spezzia, mentioned above. The weight of projectile is 2028 lbs., and velocity at 4375 yards from the muzzle. 1470 f. s., giving an energy of 30,400 foot-tons, or 615 foot-tons per inch of shot's circumference, an energy which would penetrate 25 inches of wrought-iron armor. The angle of elevation for this range is 3° 54′.

Now, as regards the probability of hitting, which is almost as important as the power to penetrate. The probable rectangle for these guns at a range of 4375 yards is, for a vertical target, 7.1 feet in height and 4.2 feet in breadth; and for a horizontal target, 82 feet in length. These rectangles were determined by firing on the proving ground, and their dimensions should be be doubled to make them conform to the conditions of actual warfare. This is the rule generally adopted, and is considered a safe one. It will thus be seen that there is at least an even chance of hitting a battle-ship at 4375 yards, the range being supposed known. Of course there should be no guesswork in actual warfare in determining the distance of an enemy's ship from a permanent fortification. Means should be, and will be, at hand to ascertain the enemy's position with all desired accuracy.

While upon this subject it may be interesting to remark that 8 shots were fired from these guns on the proving ground with an angle of elevation of 18°, which gave a mean range of 13,146 yards or 7.46 miles. The dimensions of the probable rectangle (horizontal) deduced from these shots were 164.5 feet by 36.1 feet. Doubling these we see that there is a fair chance of hitting the deck of a ship coming bow on, with these guns, at a distance of nearly 7½ miles. The striking velocity would be 1185 f. s., angle of fall 35°, and energy 19,754 foot-tons—enough even with a glancing blow to demolish the deck of any ship.

III.

"Military Instruction of Our Youth and Citizen Soldiers." *

Colonel Thos. M. Anderson, 14th Infantry, U. S. A.

As the Swedish and Swiss armies are militia organizations, it seemed well to consider, in connection with the subject of the lecture, their methods of training their so-called citizen soldiers. In Sweden and Norway the Army is kept up by a rotating militia conscription, with an annual training of from thirty to forty-two days for each contingent.

The active contingent of the Swiss Militia is 3 per cent. of the total population, maintained at a cost of $25 per year. This body has a preliminary training of four weeks, and of eight days a year during each term. This is for infantry; the other branches have six weeks. All officers have six weeks' instruction besides taking their turns in the drilling of troops.

But the notable point is, that in both Sweden and Switzerland all boys at school are trained in military exercises. In 1882 there were 272,000 boys in the Swiss schools, a very respectable contingent. In this it is suggested there is an example for us. If we can have training in our schools we need not trouble ourselves about the shortcomings of State guards.

Nor is it certain that our militia care much for our help. I know three regular

* See article by Lieutenant Eastman, this JOURNAL (*ante*).

inspectors of the State Guards who have stated that most of the men they have inspected seemed indifferent to their suggestions, and that some of the colonels had shown by their manner that they thought they knew more than their inspectors.

Nevertheless, I think, on the whole, that there is a sentiment of mutual respect subsisting between our Service and the Guardsmen which it is our duty to cultivate.

Captain W. E. Birkhimer, A. J. A.

While undoubtedly military training in schools would prove beneficial, if wisely practised, yet the great duty of the Regular Army must be to prove itself worth the money expended on it, as a regular army, pure and simple, and not as an instructor of the youth of the land. Primarily the Regular Army should strive to arrive as a regular army at a high state of efficiency and keep it, and secondarily, only, as a coacher of National Guards.

I have been a witness to a state of affairs in the matter of the ardor of "citizen soldiers," as the lecturer called them, which excited my admiration and at the same time is food for serious thought. It always pleased me to see the military profession honored and military spirit evinced anywhere under any circumstances. But to see that spirit misdirected is not pleasant. This I have witnessed in the Southern States when I was last stationed there, in the competitive drills which were holden at various times in some of the cities, and where I often acted as judge. These companies were as a rule composed of the best young men in the South. They were martial in their instincts, soldiers by nature. They carried the points of company drill for infantry and gun-drill for artillery, far beyond all practical requirements in accuracy of execution. They ran to the showy features, which would please the eye, but apparently thought nothing of other more important matters not calculated to arrest the attention of the multitude assembled to witness the drills. They knew and cared little for camp duties. Their pieces were not kept in good condition. Skirmish drill was scarcely known and its value not appreciated. All the military parade was for mere show. The friends, mothers, sisters of the contestants were there to rejoice with the winners, or join in the maledictions of the losers. Large sums of money were put up as prizes. Now, all this was in one sense pleasing, but in another point of view it was a really saddening sight. It was pleasant to see this display of military spirit, but it was saddening to see it wasted, or having an unhealthy growth. Now the point I want to make is that, if this military spirit can be directed in proper channels, it ought to be possible to utilize it practically for the benefit of the communities in which these military organizations reside, and also for the benefit of the general government. Take the artillery companies of New Orleans for instance. The old Washington Artillery had a history that any battery or regiment might be proud of. And, speaking as an artilleryman I would say that I have never seen any body of troops of that arm with whom in war I would rather take the field than the Washington Artillery. They lived and thrived on their military spirit, and the sacrifices of time, comfort and means these men would make to keep up their organization and perfectness of drill was pleasing and astonishing. I would like to see some method adopted by which these volunteer organizations, call them citizen soldiers or what you will, would be recognized and made to understand that their efforts and real worth are appreciated. But the matter is one that requires delicate handling, and spasmodic efforts will little avail; nothing will be of permanent use unless it be a maturely digested plan carried out under the auspices of the General Government in aid of the States.

Lieut. Edward J. McClernand, 2d Cavalry, U. S. A.

It will be a great step in advance if we can induce the States to introduce a military training in their public schools. The discipline and setting up, little as it might

be, would be useful in either military or civil life. The youth of the land takes naturally to a military company, and with some persuasion and instruction this tendency could be turned to good advantage. We might, at least, succeed in turning the thoughts of many of these youths toward military subjects, who now never give them any consideration. This would result in the general public being better informed as to our military necessities, something very much to be desired.

It is not clear to me how much benefit is to accrue from the use of non-commissioned officers, as suggested by Mr. Eastman. The National Guard is already giving too much attention to the smaller details of drill to the exclusion of more important matters—discipline, camps, marches and battle tactics. Associating the Regular regiments with those of the National Guard during their summer encampments will probably give better results than anything else. To produce the best effect we should make our model as perfect as possible. Of course, if they will not have us, we cannot force ourselves upon them, but the officers of the Regular Army should try, through the press, to convince the Guard of the necessity for such association. In several States these camps have been tried, but not on a scale large enough to accomplish much. In States like New York, for instance, a regular regiment might remain in camp during the summer, and show by their discipline and real camp life (with all the attendant features of summer manœuvres), what the National Guard regiments should strive to become. The matter of social life between the men of the two organizations need not have, nor should have, anything to do with the subject. In this way different regiments of the Guard, succeeding each other at "short" intervals as they do in camp, might and would receive valuable instruction.

In any reorganization of our forces, with a view to prepare ourselves for war, there should be included something not touched upon by the lecturer and perhaps not strictly within the scope of his paper; that is the immediate formation of depot companies both for the Regular and National Guard regiments. It will not alone suffice to send a large army into the field at the outbreak of war; in all reasonable probability such an army will need fresh material both quickly and frequently. Proper means to recruit it should be devised beforehand, that no unnecessary delay may occur, and in order that the recruit may not arrive at the front a novice to all that pertains to his duties, and, on account of the sudden and very decided change in the habits of life, a ready victim for disease.

IV.

"Notes," "Memoirs" and "History."

Brevet Lieut.-Col. Carswell McClellan, U. S. V.

THE January (1890) issue of the JOURNAL OF THE MILITARY SERVICE INSTITUTION contains a notice of a pamphlet entitled "Notes on the Personal Memoirs of P. H. Sheridan, by Carswell McClellan, Brevet Lieutenant-Colonel U. S. Vols."

This review is something more than the usual literary criticism generously granting valuable space in recognition of a new publication. If simply a critique, no comment could be attempted, and none would be needed. That exposure of reiterated detraction, prepared expressly for posthumous circulation, cannot be justly branded as "kicking a dead lion," may safely be left to the intelligent reader. That neither the degree of knowledge possessed by the writer of the "Notes" as to the notorious restlessness and complaint induced by the duty required of the Cavalry Corps of the Army of the Potomac during the winter of 1863–64, and the spring following, nor the protests and disapproval of the superior and subordinate cavalry commanders, could alter

the conditions necessitating that arduous and harassing duty, and that neither have any bearing upon the method of General Sheridan's representations of his subsequent protests, is manifest. Shiloh, Murfreesboro, Manassas, Chancellorsville, Gettysburg, Spottsylvania and the North Anna will not be entirely without influence in favor of a wise conservatism; and the precise functions of the future cavalry arm may well be left to later consideration after research shall have proved able to formulate the tactical theories of General Sheridan, and experience shall have demonstrated in how far the leading Powers of Europe have been able, or willing, to follow him in departing from "inflexible tradition."

The feature of the review to which it is especially desired to ask attention is the peculiar and quasi-historic statement it advances, as follows:

"Nor was it impertinent nor insubordinate, under the letter and spirit of his assignment by the Lieutenant-General present with the Army, and directing its operations in person, for General Sheridan to express to General Meade his views as to the proper use of cavalry in the field; views which, in spite of inflexible tradition, have recently been adopted by the leading military Powers of Europe. The sooner it is admitted that, while *nominally* 'commanding the Army of the Potomac,' General Meade, upon the arrival of Lieut.-General Grant at its headquarters, became simply Chief of Staff, the easier it will be to deal justly with General Sheridan's words and deeds as the Chief of Cavalry."

This remarkable statement can only mean that, in the opinion of the reviewer, both General Meade and General Sheridan derived the authority they exercised from the Lieutenant-General, and that the presence of their superior at or near the headquarters of the Army of the Potomac, while directing the armies of the United States, reduced the commander of that army to the grade of Chief of Staff, elevated his corps commanders to rank equal with that of their commander, and absolved them from attention to his orders. That, in the JOURNAL OF THE MILITARY SERVICE INSTITUTION, a statement and theory so repugnant to established usage, and as annihilating to discipline, can be authoritatively advanced as professional and tenable, is no light matter. A discussion of the technical points involved cannot be necessary. It is, in truth, extremely difficult to understand how the theory can be established with credit to General Sheridan, who certainly never consented to its application where it would diminish his own authority. Undeniably it is against the controlling authority of *a superior and commanding officer* that the pages of his Memoirs enter protest, and if the authority of that officer was hampered by the overshadowing presence of the Lieutenant-General, the generous appreciation and consideration of a subordinate and loyal soldier could not have tolerated the conduct of which General Sheridan boasts.

Generals Grant, Meade and Sheridan were assigned to definite commands by the President of the United States and derived their authority *from him*. The commission of Lieutenant-General carried with it no inherent authority to remove General Meade from the command he had held for nine months when General Grant arrived in Virginia. Had General Grant, however, desired a change in the command, undoubtedly, it would have been made by the President; and General Meade would have cheerfully acquiesced (Grant Memoirs, vol. 2, p. 117). But we are assured in the Military History of U. S. Grant (vol. 2, pp. 15, 16), that "Grant had no desire for the removal of Meade. * * * The question of Meade's removal was never mooted between the Administration and the lieutenant-general." General Grant repeats (Memoirs, vol. 2, p. 117), saying: "I assured him [General Meade] that I had no thought of substituting any one for him," and in his official report (Memoirs, Vol. 2, pp. 558, 563, 564) he says: "Major-General George G. Meade had the immediate command of the Army of the Potomac. * * * I may here state that, commanding all

the armies as I did, I tried, as far as possible, to leave General Meade in independent command of the Army of the Potomac. My instructions for that army were all through him, and were general in their nature, leaving all the details and the execution to him." In his Memoirs (Vol. 2, pp. 117, 118) he repeats the statement. It is impossible to see how General Grant could more emphatically recognize General Meade as actual commander of the Army of the Potomac—including, of course, its cavalry corps.

We have also emphatic assurance that General Meade was entitled to every consideration belonging to his position and rank. General Badeau (Vol. 2, p. 15) states: "The position of Meade was now one of peculiar delicacy. * * * He might very naturally have been discontented; but no manifestation of such a feeling was apparent. He displayed, on the contrary, a marked magnanimity." General Grant corroborates this statement (Memoirs, Vol. 2, p. 117) and in his dispatch to the Secretary of War, May 13, 1864, he states unreservedly: "General Meade has more than met my most sanguine expectations. He and Sherman are the fittest officers for large commands I have come in contact with." The pages of the Military History and Memoirs of U. S. Grant bear numerous confessions of a similar character, and, finally, General Badeau occupies no less than six consecutive pages (Vol. 2, pp. 186–192,) in the attempt to prove that, as commander of the Army of the Potomac, General Meade was an impediment in General Grant's way—notwithstanding his acknowledged ability, earnestness and magnanimous loyalty.

To maintain in the face of such evidence that, "while *nominally* 'commanding the Army of the Potomac,' General Meade, upon the arrival of Lieutenant-General Grant at its headquarters, became simply Chief of Staff," and General Sheridan "Chief of Cavalry," not only deprives General Grant's authorized historian of a carefully cherished scape-goat, but, also, places General Grant himself in an extremely unenviable position which it is not necessary now to specify in detail. Even the insinuation of "ingenious distortions" and "sinister interpretation" cannot alter the stubborn facts.

And yet, unfortunately, it must be acknowledged that the pages of General Grant's Military History and Memoirs, by innuendo, partial truth and obvious misstatement, bear ample evidence that the JOURNAL review has formulated what they tender as an insinuation by which it has been hoped to neutralize confessions forced by unavoidable facts. The Memoirs of General Sheridan but make the fact more glaring. Having in his publications endeavored to draw attention to this point, Colonel McClellan is indebted to General Rodenbough for the aid given in his frank and concise statement of the assumption upon which the claim of General Sheridan's subordination rests.

Doubtless there are many who deprecate discussion of these points and would prefer that prejudice should stand unanswered until legalized by time, but it is to be remembered that to no sect, or individual, has yet been given authority to voice the wishes of the survivors of our War; to prescribe material from which the historian shall construct his work; or to limit the sources from which the Army of the Republic shall draw its lessons of martial dignity and worth.

Yes; the lithe form of Warren stands very clearly defined upon Little Round Top —*and not there alone.* It flashes through the sulphur clouds at Bristoe. It rises grandly in its unselfish dignity as the gray morning breaks at Mine Run. Unfalteringly it leads his noble corps through the gory mire from the Rapidan to Petersburg, and at Five Forks holds high, and honored yet again, the cross that claims him knight and chieftain true. No shadows will be allowed to rest upon the quiet grave beside the sea where sleeps the hero who, in life, was requited with a broken heart instead of the honors he had won. The sun of truth is rising strong and clear.

XUM

V.

"Mackenzie's Last Fight."

Major G. W. Baird, U. S. Army.

IN Captain Bourke's most interesting narrative of "Mackenzie's Last Fight With the Cheyennes"—January number of the JOURNAL—appears the following: "The operations begun in February, 1876, * * * and maintained throughout the ensuing summer and fall, by various large commands under Crook, Terry, Gibbon, Miles and others, had not been specially fruitful in satisfactory results." Whatever the justness of it as a general criticism of the spring and summer campaign of 1876, the truth of history and justice to the troops engaged require a correction in one particular. Nearly a month before the expedition, of which Captain Bourke writes, left Fort Fetterman, General Miles with the Fifth Infantry, three hundred and ninety-eight rifles—marched out from cantonment at mouth of Tongue River, against the hostiles under Sitting Bull. This little force attacked and routed Sitting Bull's following on Cedar Creek—a northern affluent of the Yellowstone—pursued them to the south side of the Yellowstone, and, on the 27th of October—nineteen days before the "Powder River Expedition" left Fort Fetterman—compelled the surrender of over four hundred lodges—two thousand Indians.

This success, important in itself and at any time, has unique interest and value as the first considerable success after the disasters of the previous summer, and as the beginning of a series of victories which brought the great Sioux War to an end.

BOSTON, MASS., January 28, 1890.

VI.

"A Number of Uncommon Excellence."

From Colburn's United Service Magazine (London).

IN the first article of the November number of the JOURNAL OF THE MILITARY SERVICE INSTITUTION (New York), "Major C. B. Greenleaf, Surgeon U. S. Army," enters minutely into various methods of noting personal peculiarities of men enlisting, with a view to their subsequent identification if they desert. The difficulty of obtaining positive evidence of identity from photographs, owing to the changes in appearance caused by wearing or removing hair or beard, by altered states of health, etc., are stated, and some instances of total failure are given. The defects of two other methods, the "measurement and record of unchangeable anatomical parts," and the "record of permanent bodily markings," are then fairly demonstrated. Major and Surgeon Greenleaf expresses his preference for testing personal identity by the reproduction on paper of the impressions of the ridges and furrows on the skin of the finger tips! These impressions are got by pressing the finger tips lightly on a surface coated with black paint or printer's ink, and then pressing the inked fingers on white paper. The difficulties of carrying this plan successfully into practice seem infinitely greater than those attending the use of photography.

Lieutenant Hawthorne considers several plans for inter-oceanic communication across Central America, with reference to their strategic importance to the United States. His article is interesting and instructive.

"The Use of Railroads in War," by Lieut. Carl Reichmann, amply repays perusal. It reviews the progress of what may be called railway warfare from 1859, when railways were used by Austria in concentrating her troops on her northern frontier, in anticipation of war with Prussia. Much of the article is devoted, naturally, to the use, the breaking up, and the repair of railways during the American Civil War.

XUM

A well-written article on "Military Training of the Regular Army of the United States," by Lieutenant Burnham, contains some passages of general interest, though the greater part is applicable only to the peculiar constitution and circumstances of the army to which it refers. His views of drill, tactics, manœuvres and discipline are practical and progressive. But why will so many American writers call the "regular" soldier all through his service "the enlisted man," as if joining the Regular Army made him a special variety of the human race? Lieutenant Burnham thinks that officers should be selected for the engineers and artillery chiefly on account of their mathematical attainments, but that for the other branches mathematical knowledge is of minor importance. Writing of military sports and amusements, he says: "I see no good reason why at least one evening each week should not be given to the men for the purpose of engaging in theatricals, or devoting it to such other amusement or recreation as they see fit. In this manner the men would have no time to get drunk, no occasion to complain, and health and vigor would be imparted to both mind and body, thus punctuating with dashes of pleasure the more confining and arduous duties of their military life."

First Lieutenant Reilly's proposals for the "Revision of Infantry Tactics" certainly do not err in the direction of excessive simplification. His complicated organization and movements are unsuited to the conditions of modern war.

Reprints and translations, notes, comments, and reviews, make up a number of uncommon excellence.

VII.

"The Use of Railroads in War."

(From Letter of Correspondent in "Revue du Cercle Militaire," translated by J. C. B.)

I HAVE just read with much pleasure a study on the use of railroads in war, by Lieutenant Reichmann, 24th Infantry, U. S. Army.

This article appeared recently in the JOURNAL OF THE MILITARY SERVICE INSTITUTION, and you know that in order to secure entrance to its pages the authorization of a committee of army officers is necessary.

I think that, with the exception of certain points which seem open to criticism, it merits a rather detailed *résumé*.

In the first place he remarks that the Germans, Italians and Austrians have taken care to have the same R. R. gauge; their carriages can thus run with all speed over the roads of the countries of the triple alliance. Russia on the contrary, for military reasons, has taken a much wider gauge, 1 m. 524. But the defensive advantage is not great because it is easy for the invader to insert an intermediate rail for lessening the gauge, while it will be less easy for Russia to enlarge that of her enemies. The author claims that the Germans were much inconvenienced in 1870 by the difference in R. R. gauge existing between France and Germany.

I believe that the inconvenience on this account was practically nothing, for had you not formerly German carriages running rapidly over your lines and have you not the same still? Then too the width of track in the two countries, if not exactly the same, is at least sensibly so, and could hardly cause serious embarrassment. The author recommends to the invader the seizure of as much of the enemy's material as possible, or if that cannot be done, to choose material appropriate to the gauge, and cites several catastrophes which have resulted from this lack of precaution in the use of material.

How many trains can pass over the lines on single and double tracks is the next question treated. There, again, I think I discover an error. The author affirms that in 1870 no more than eighteen trains were sent over double track lines per day. Now

I have read lately several works which all assure me that this number can be easily exceeded, notwithstanding the time taken for embarking and debarking. To cite one example: The single line from the East has furnished more than double the number of trains given by Lieut. R. during certain days—and heavily laden.

If we can credit this study, what, above all, caused the primary advantage of the Germans in 1870 was that nine of their lines converged upon the menaced frontier, and brought there troops from all parts of the country; while the French had at their command only four lines radiating from Paris and diverging more and more as they approached the frontiers. We should not be surprised, then, that the French concentration was behind that of the German. From that cause came the first defeats.

The author then speaks of the employment of lines after concentration. He says in regard to this that our numerous railroads form our only system for defending the coasts by transport to the threatened point, at the proper moment, of troops held in reserve at a few points, thus avoiding a fatal dispersion of strength. But here, again, I will observe to the author that the coast lines should not be easily destroyed by the enemy's fleet, an inconvenience presented, for example, by the Italian coast system. Unless such destruction is prevented, we cannot rely with certainty on this means of defense.

Lieut. R. explains, further on, that without the railroad it would be nearly impossible to transport the enormous quantities of food, ammunition, etc., necessary for modern armies.

The War of 1870 without railroads would hardly have been so disastrous to the French. The enemy's progress would have been much slower and time would have been given to recover from first reverses.

The author concludes by saying that railroads tend to facilitate war, to intensify it, and, in consequence, to abridge its duration. The happy ending of a campaign should be a presage of final success, for the proper use of railroads should give the adversary no time to rally.

XUM

Reviews and Exchanges.

Wallenstein.*

THE author, who in this as in all his military criticisms, shows deep and comprehensive study—carries us with him to his conclusion of "showing what an extraordinary man he [Wallenstein] was at the head of armies of his own creating, and in the administration of everything necessary for their maintenance and success, as well as for his own success and rise." He would evidently deprecate the charge of treason against his hero. But the base assassination, approved or directed by Ferdinand II., scarcely disproves the charge. As the author admits, Wallenstein was too high and strong to be brought to trial. The consensus of public opinion in all subsequent time has been against the purity of his aspirations. It dare not be said that he was a patriot: he only came to the defense of his country on terms too humiliating to his sovereign to be justified by the situation. His greed and ambibition were unbounded. No high or unselfish principle can be predicated of him. At last between him and Ferdinand the Spanish choice lay, *Si sea de V., ó de mi, primero yo!*

It is not to be wondered at that the popular world were not dazed by the brilliance of his feats, and have not rated him at his worth as a commander. The circumstances of the times, the disorganized state of the country, social, religious and political, conjoined to evolve Wallenstein, as afterward Napoleon was produced. True, Napoleon found an army to his hand, but Wallenstein found a multitude for whom to soldier was easier than any actual mode of life at their command. Though in fight capable of what any man would dare, yet he made no brilliant victories. He paralyzed his enemies by a Fabian system of manœuvres, accomplishing wonders.

It is scarcely fair to consider Gustavus Adolphus worsted by Wallenstein. There appears to have been a terrible entanglement of cross interests involving both Gustaf and Richelieu. This, a Roman prelate, true no doubt in heart to his Church, was eager for heretic secular help; while Gustaf, probably not less true to the enlargement of German Protestantism, stayed his hand at the question of subsequent empire. Had he only looked to conquest, we must not assume that he would not have advanced at the proper time on Vienna. Neither ignorance nor fear certainly deterred him. Whether judicious or not, as we now view it, it must needs have not suited his policy held at the moment, which in fairness may be referred to his conceived duty to the Protestants of the League.

It is true that Wallenstein checked him at Nuremberg, and the author's proposed scheme for Gustaf to have held Nuremberg by a portion of his army, sending the rest to raise the Protestant districts against Vienna, appears so feasible that it is hard to

* This is a reprint of papers first published in *The College Student*, Franklin and Marshall College, Lancaster, Pa., under the *nom de plume* of "ANCHOR." In the pamphlet these papers are preceded by a most elaborate array of recondite historical notes, immensely valuable to the student of those times. By Gen. J. WATTS DE PEYSTER. New York, 1889.

deny its conception to a man of Gustaf's ability and reliance in his army. I think we are forced to conclude that it was not Gustaf's policy to strike then at Vienna.

Beyond this he appears to have been forced by his death rate to bring on battle. It certainly, with our lights, appears to have been unwise to attack Wallenstein's intrenchments.

But when they met more fairly at Lutzen, though through his imprudent rashness Gustaf fell, Wallenstein was certainly defeated.

It would be vain to criticise the military accuracy and deductions of the author. As an administrative man and organizer he makes out an excellent case for Wallenstein's peership. People's prejudices will in a great degree determine them as to the superiority of his generalship over Gustaf.

The pamphlet appears to be most valuable to us as a comment on our own generals. The errors of Gustaf are always paralleled by Sherman, Grant, or Franklin, etc. When Tilly succeeded it was because he had inferior troops before him, "like Lee had opposed to him," or had generals opposed to him "hampered by politicians, or sacrificed to half-hearted support like Pope."

The author is freed from the glamour of Napoleon. He points out his military errors freely, and estimates his claims fairly.

The author is evidently not afraid of that which brought Wallenstein "to grief," viz.: a dominant priesthood. He is very impartial of his sword as against papal, jesuitic, anglican, or Scotch anathema.

Grant at Cold Harbor, and Franklin at Fredericksburg, come in for unqualified reprobation.

The style is sometimes obscure. "In some respects Wallenstein was a more wonderful personality than Gustaf, and he brought forward subordinates who were equal to Turenne, judging that general by his connection with the French period of the Thirty Years' War, and even as executives to Stonewall Jackson, while he himself was vastly superior to Grant, Sherman, Sheridan and Lee." [McClellan presumably excepted. In fact he is ignored by the author, either for praise or blame.—J. H.]

The author is fertile in deductions and here shows his long recognized ability to get at the pith of a military principle. One is striking. "The soldiers who are vastly the best in the beginning soon teach their style of game to the adversaries, and show them how to play it." And yet it is not held that at any time Wallenstein with 25,000 of his best could have stood before Gustaf with 25,000 Swedes.

The author, we think, steps aside to deprecate the glory of our own later heroes who were in at the end of the chase. It cannot be said fairly that Grant and Sherman and Sheridan did not work hard all the way through the War, and did not do their full share in weakening and preparing the enemy for their final victories. It is believed that their admirers in no way forget those who struggled and fell by the way.

En passant he raps over the knuckles those who would rank Lee among the great generals of history.

In matters of religious belief he impresses the reader with a position that there is no choice between the acceptance of narrow dogmata on the one hand, or of agnosticism on the other.

J. H.

The Campaign of Königgrätz.*

In the May number of the JOURNAL M. S. I., Lieutenant Wisser reviewed an excellently written *brochure* by 1st Lieut. A. L. Wagner, 6th Infantry, on the campaign of Königgrätz.

The favorable reception accorded his first effort has induced the author to revise and amplify it so as to include an historical sketch of the entire Austro-Prussian War.

This has added much to the reader's appreciation of the general events transpiring in the course of the struggle, and renders the work a more complete account of a campaign, which coming so soon after our own War, lasting but two short months, and preceding by but a few years the great struggle between France and Germany, has failed to attract the attention it deserved among military students in general.

Lieutenant Wagner's object in writing the book, has been, 1st. To give a brief, but accurate historical sketch of a great campaign to which but little attention has been given in this country. 2d. To make a comparison of some of the military features of the War of Secession, with corresponding features of this European War which occurred one year later.

In other words, the book finds its place mainly as an example of a campaign studied in the light of our own War. This phase of the subject is one of peculiar interest to the American student. Happening so closely in point of time, the two wars offer a fair comparison between the efficiency of the armies engaged; their tactical methods; their employment of cavalry and artillery; their use of railroads and the methods of supply and transport resulting therefrom, the telegraph, etc., etc.

Remembering the extent of the theatres of War in the two countries, and that our own was a Civil War and not a National one, we believe with Lieutenant Wagner that such a comparison cannot result wholly to our disfavor, whether we seem to view the generalship and soldierly worth through Confederate spectacles *à la* Lord Wolseley, or whether our sympathies incline us towards the Northern side of the contest; and that the germs of many things regarded as new in European armies may be found fairly well developed in the latter part of our Civil War.

In regard to the campaign itself the author claims, and with much show of justice, that von Benedek's strategy was bad from the beginning, but that his dispositions on the decisive field of Königgratz were in the main good, the unfortunate position of his right being due to mistakes of subordinates: That though the needle gun was a great source of strength to the Prussians, it did not really affect the result of the campaign at all, the Prussian strategy and tactics being so much superior to those of their opponents that disaster would have quickly overtaken the Austrians if the Prussians had been no better armed than they: That the tactics of Sherman's infantry was more nearly a prototype of the present attack formations of all European armies than was anything that could be found in the tactics of the contending infantry in 1866: That the Prussian artillery was impotent, and that the action of the cavalry on both sides was feeble and unskillful: That great raiding opportunities were thrown away, and incidentally that neither Von der Golts nor Prince Hohenlohe has grasped the true idea of American cavalry raids.

The author concludes: — "Thus ended the great battle of Königgrätz. It is not only on account of its great and far-reaching results that Königgrätz must be rated as one of the greatest battles of the world; in point of numbers engaged it was the greatest battle of modern times; for the two contending armies aggregated nearly half a million men. In this respect it exceeded Gravelotte, dwarfed Solferino, and even

* *The Campaign of Königgrätz.* Lieut. Arthur L. Wagner, U.S.A., Fort Leavenworth, Kansas.

surpassed the "Battle of Nations," fought on the plains of Leipsic fifty-two years before."

The book is handsomely gotten up, the typography excellent, the maps and general arrangement good, and Lieutenant Wagner's well-known ability as a writer quite sufficient guarantee in that regard.

We commend the book to the careful attention of our readers.

J. C. B.

Tenting on the Plains.*

"Tenting on the Plains" is essentially a story of the "family side" of General Custer's life, and will therefore be of special interest to those who knew and loved him. There is much, however, of interest and information for the general reader.

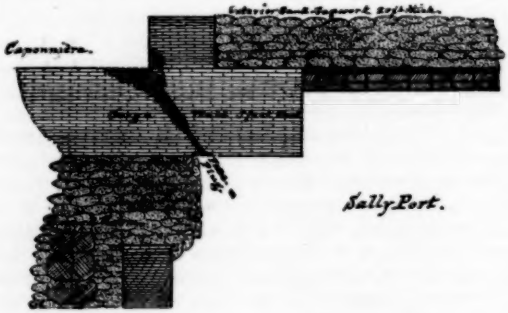
Nearly half of the 700 pages are devoted to a description of the life and troubles in Texas and the Southwest during the "reconstruction period" immediately following the great War.

The story is simply but charmingly told, and the reader's mind is apt to wander from the contemplation of the deeds of him whose life the pages describe to lose itself in admiration of the pluck and perseverance displayed by the author in braving discomfort, hardship, and even terrible danger in order to be nearer the object of her love and affection.

E. M. L.

The Strange Performance of a Fuse-plug at Fort Sumter in 1863.

The following is a fact vouched for by the author of a forthcoming volume upon the defense of Charleston Harbor in 1863-65.†



It was on the fourth day of General Gillmore's first bombardment that a singular incident occurred at Fort Sumter. A rifle shell with percussion fuse had struck the gorge-wall, six feet above its base, to the right or east of the heavy sand-bag work, protecting the sally-port on the exterior, and in the nearest corner of the caponnière; but its

* *Tenting on the Plains.* By Mrs. E. B. Custer. New York: Webster & Co., 1887.

† "*The Defense of Charleston Harbor, including Fort Sumter and the Adjacent Islands,* 1863-65," by John Johnson, formerly Major of Engineers in the service of the Confederate States. With original papers in appendix, full official reports (both sides), maps, and numerous illustrations. Charleston, S. C.: Walker, Evans & Cogswell Co., Publishers.

slant direction of fire, an angle of nearly 40°, had turned it toward the open arch-way of the sally-port, and away from the guard-room, packed with wet cotton bales and sand, which would otherwise have stopped it. Yet it had not penetrated through to the interior; only the fuse-plug had done so, making its own narrow track, and leaving the shell buried in the wall some twelve inches behind it. The fuse-plug had passed into the open space and through it into the parade, where it was found. Had the shell been found on a line two feet to right or left, the incident could not have occurred; for though the plug might have been forced through the wall into the guard-room, it would never have been discovered, being lost in the filling of the room. And, if the shell had entered more to the other side, too much brick wall would have opposed itself for the energy of the fuse-plug to overcome.

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XUM

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JOURNAL

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OUTLINE OF A MANUAL OF INFANTRY DRILL.*

By LIEUTENANT-COLONEL H. S. HAWKINS, U. S. A.,

Twenty-Third Infantry, Commandant of Cadets.

IN the month of December, 1886, I made official request for a Board of Officers to examine and report upon a complete system of infantry drill which I had devised.

The reply was that when a board should be organized to *revise* the infantry tactics my system would be submitted.

I endeavored to convince the authorities that such action would not accomplish the purpose, for if the board were organized to revise the tactics it could not consider, officially, any system offered.

I was then informed, verbally, that there were other officers who wanted such action, to which I replied that my application was as much in their interest as in my own and that it was in the interest of the Army at large; that a board should be ordered to consider every system presented, not only to encourage those who had devoted their time and thought to this object but to stimulate others and to acquaint the whole Service with whatever of merit or defect was to be found and thus help the growth

* Read before the West Point Branch of the Military Service Institution, February 26, 1890.

of that which must always be a matter of evolution. I well knew that several officers had been hard at work and it was not justice to them or in the interest of the Service that their efforts should be ignored.

Doubtless all other applicants presented similar views.

The result was that a Tactical Board was organized to *prepare* a system.

When it asked for my manuscript of the work herein sketched I made official request that the board be authorized to criticise it, and I know that the gentlemen on the board were willing to undertake the task.

The request was refused.

To repeat: Officers should generally be made acquainted with what has been attempted in the development of an *American* system of infantry drill, and this must be my apology for asking attention to this sketch of my own effort in that direction.

EXTRACTS FROM WELL-KNOWN WRITERS.

General Hamley.—Manœuvres are the quick, orderly change of highly-trained and flexible masses from one kind of formation to another, or their transference from point to point of a battle-field, for purposes which become suddenly feasible in the changing course of the action.

Col. R. Home.—Drill is a means to discipline, but drill is not discipline, which may be defined as obedience to superiors.

Capitaine Vial.—If only 100 men have to be moved, certain subdivisions are requisite to give them a cadre and commanders. There must be some definite instruction for both men and officers; there must be principles, rules and theories.

Jomini.—It is absurd to call a body composed of twelve battalions a division at the same time that two companies are termed a division. I do not pretend to say if it was a confusion between these two words that caused the formation of the heavy masses at Waterloo. However that may be, it is requisite that perfectly distinct terms should be used to denote a division of twelve battalions and a division of two companies.

IMPORTANCE OF THE INFANTRY ARM.

Colonel R. Home.—In armies, infantry undoubtedly takes the lead, and to its action that of the other arms must be subordinated.

An intimate knowledge of infantry tactics consequently becomes most essential for officers of the auxiliary arms,—cavalry, artillery *and* engineers, it being their duty to aid and facilitate the action of the infantry; and they must seek, not what is most advantageous and best viewed from a cavalry, artillery, or engineer point of view, but what is best, viewed from an infantry point of view.

* * * * * * * *

Infantry is undoubtedly the mainstay and the backbone of all armies, whether it be in the light of numbers, or its action on the field of battle. Its fire is more deadly than that of artillery; its action is sure while that of cavalry is fitful.

On the infantry of an army the brunt of the fighting falls, it suffers more in action and more on the line of march. Artillery fire but to pave the way for an infantry attack or to check an infantry advance. Cavalry charge but to confirm an infantry victory or to check a pursuit. Engineers open roads and make bridges to allow infantry to pass; they strengthen positions and throw up earth-works but to protect and cover the infantry, or to enable a small body to resist a superior force.

On infantry tactics the whole superstructure of military operations must be built.

LOOSE AND CLOSE ORDER.

Col. Home.—Modern fighting is not *loose*, although it may be individual.

Von Scherff.—We must contrast the expression "individual" with that of "close order." We mean by the latter that formation of troops when each man has a fixed place which he must not leave, while by the former we mean a formation that assigns each man his place only in a general way, leaving to the man a latitude within certain limits on his own initiation to modify or alter it.

SUFFICIENT FORCE.

Colonel R. Home.—There has been a gradual tendency * * * to reduce the number of men occupying a given piece of ground. Concentration is undoubtedly strength, but we must clearly understand what concentration of force, in its military sense, means. It means the assembling on a given point, of a mass of units *sufficient* to deny the use of that point to the enemy if (we

be) acting on the defensive, sufficient to drive the enemy out, if acting on the offensive.

But if the *sufficient number* be exceeded, concentration becomes dangerous, becomes unwieldy accumulation. * * * Further, when military units are massed together or concentrated, it must be borne in mind that if that concentration exceeds certain limits it prevents the proper use of the men's arms.

The result of the gradual appreciation of these facts is, that the number of troops requisite to occupy a position of given length is now much less.

Von Scherff.—Experience has demonstrated that the principle hitherto considered important of reinforcing a line of skirmishers only little by little, is more dangerous and costs more men, than the use of a sufficient force from the moment the troops are within easy range.

What is meant by a sufficient force?

Taking into consideration the increase of the defensive power, we may reply: As many men as the ground will permit to be placed in line, so that they may use their weapons efficiently. * * * Since each man, to use his rifle freely, requires one yard and a half of space, it follows that the maximum number of men that can be placed in the line of skirmishers, should not exceed one man per yard and a half. * * * Every man in the line of skirmishers who on account of a want of space cannot take his share of the firing is absolutely hurtful, at the same time that he increases uselessly the chances of loss.

EXTENT OF FRONT.

Von Scherff.—What is to determine the extent of front to be given to a fixed number of men?

The distance may be arrived at as follows: one-half or two-thirds of the whole force as main body, and one-half or one-third as preparing the attack; one-half the last number spaced at one yard to one and a half yards, will give the required front.

Colonel Home.—The formation for attack is one which while occupying a front quite as long as that formerly held by a deployed line, will do so with fewer men and will give commanding officers means of feeding the front; or in other words, the area of action of a commanding officer will be as long and far deeper than formerly.

WHAT IS MEANT BY LINES.

Colonel Home.—The fight in front must be incessantly fed from the rear and hence it follows that the troops first pushed on must be composed of a portion of the same body in rear. This immediately brings up the question: What is meant by lines?

From a line of two deep it is impossible to feed a fight or support the skirmishers, for the line of two-deep is little more than a compressed line of skirmishers. Hence the words "first-line," "second-line," must not be taken as meaning either a line of skirmishers or a line of two-deep, but the troops actually fighting in the front. If three battalions be taken as an example, one battalion skirmishers, one in support and one again behind it at a further distance, the whole collectively form the "first-line," the command extending from front to rear over a far greater extent of ground than formerly.

The first or fighting line must then be formed so that it carries its own reserve or support with it, and when spoken of as the "first-line" it is not to be regarded as a deployed line of infantry.

POSSIBILITY OF APPROACH IN CLOSE ORDER.

Von Scherff.—From the first deployment until the actual collision, the attackers are exposed to the fire of the defenders. * * * The artillery, and in a short time the infantry, of the defenders become the objects of the attacker's fire. It follows that the defender's fire will be diverted from that portion of the attacking force which composes the main body (the true assaulting party).

The more the troops charged with the preparation of the attack succeed in drawing the defender's fire on themselves, the better they will do their work.

The defense will seek not to be so led. But it cannot help itself. It may direct a portion of its fire on the supports and the batteries, but the fire on the main body will be much diminished.

If the skirmish line of the attackers be not checked, the defenders will be destroyed by its fire, aided by that of the attacking artillery.

If the defenders concentrate fire on the skirmishing line they facilitate the advance of the attackers' main body.

This is the dilemma on which the possibility of attack mainly rests, and hence the necessity of giving considerable force to the troops preparing the way.

Colonel Home.—The fire of the assailants' artillery and the fire of this skirmishing line will have the effect of drawing on them both the enemy's artillery and infantry fire, *and hence it becomes possible to bring up the main body in a much closer formation than is often supposed.*

Colonel Newdegate.—When the skirmishers are involved in fire action with the enemy, close detachments can come forward with insignificant losses.

FORMATION OF MAIN BODY.

Von Scherff.—At this stage (the second zone, about 1200 yards from the enemy), if the artillery of the defense does not direct its attention exclusively upon the artillery and troops engaged in preparing the attack, it will begin to direct *a portion* of its fire on the main body. The whole ground will thus be swept by a nearly evenly divided fire; the effect, therefore, unless the attackers be very badly handled, and so formed as to induce the defenders to concentrate their fire on certain points, will be nearly the same, no matter in what formation the main body may be.

The more a mass of men is concentrated, the more confidence is given in its force and the greater the number of men likely to show a good example and impress a motive power on the whole mass.

But a heavy loss occurring unexpectedly and all at once, demoralizes the mass more than if the same loss is distributed over some time and in different places. * * *

The question then is: What front must we give and what depth can we take for the troops of the principal body at this moment?

The size of the fractions into which the main body must now be divided must be such that the leader can exercise a personal influence, and that they can move easily to the front and yet be sufficiently compact to give the soldier the idea of solidity.

Colonel Home.—The formation requires to be such as will enable the men to advance with speed without being demoralized; and this appears to be more likely to be attained by small columns than by either a line or extended formation.

ACTION OF THE SUPPORTS.

Colonel Home.—The duty of the supports is * * * to keep

the (firing line) up to the "sufficient number." Hence the officer commanding the supports must watch the front. The nearer to the skirmishers the supports are the more they will suffer, but if too far off they will cease to act as supports. * * * As the skirmishing line advances and gets into the zone of aimed fire, or some 600 to 700 yards from the enemy, the supports must be freely pushed on * * * and as the advance of the skirmishers * * * by successive rushes will be slower than that of the supports, the latter will close on them, and the main body will also close somewhat on the supports.

As the fire is kept up the main body will advance, and when it comes near the line of supports the latter should rush to the front and join the skirmishers.

Von Scherff.—The moment the main body arrives near what is left of the line of supports, they should dash to the front and join the line of skirmishers, in order to give the impulsion requisite to cross the last and most dangerous zone of all, and finally give the assault.

LAST PHASE OF THE ATTACK.

Colonel Home.—If an attempt be made to realize the state of affairs at this period of the attack it will be seen that the skirmishers, reinforced by the supports, are within 250 to 300 yards of the enemy; that the main body is some 300 yards in rear of the skirmishers; the divisional artillery, perhaps, some 1200 to 1400 yards off, supported by a portion of the corps artillery, the remainder of the corps artillery occupying advantageous places up to 2000 yards off, and all bringing a heavy cross-fire on the enemy's position; the second line of troops following in rear of the main body of the first line, perhaps 500 to 600 yards from it. A tremendous fire is maintained by the now thickened skirmishers and the whole front is covered with clouds of smoke.

Such a state of things cannot last long. The skirmishers may get a hundred yards nearer and the main body getting closer to them must prepare to carry the position.

Gradually converging, the various portions of the main body must push rapidly to the front and drive the enemy out; while the second line seeing the advance and hearing the cheers should push rapidly on to support the attack, meet the enemy's reserves and confirm the success.

SKIRMISHERS MUST ADVANCE IN THE ASSAULT WITH MAIN BODY.

Von Scherff.—The idea of leaving the skirmishers lying down while the main body rushes to the assault is contrary to the fundamental principles of the attack, which is that all the disposable force should be applied. Leaving them behind really leads to nothing. They could not fire, they could not collect and reform the débris of troops crushed by the enemy's fire. They have done and suffered too much for that.

Judging by all experience they must push on with the rest.

To leave them lying down is in the most favorable case a useless course; generally it will be a dangerous one.

SECURING THE POSITION.

Colonel Home.—The moment the position is carried every effort must be made to hold it. The troops should be reformed. A heavy fire should be poured on the enemy as he retires, and the second line following rapidly, must endeavor to occupy the ground. Coming up in regular order they can do so far better than troops whose nerves have been wrought up to the highest pitch of excitement by a successful attack.

STRENGTH OF A COMPANY.

Colonel Home.—Taking into consideration that the size of the company is limited by the number of men that can be influenced by one man, it appears that the Prussian system of four companies to a battalion is correct. * * *

The more personal intelligence there is distributed through a body of men, the larger the number of officers there are in that body trained and competent to lead it, the more efficient will that body be when placed in the difficult positions of actual combat: taking this, and the fact that the Prussian proportion of officers leaves no margin for sickness or loss, and that the front of a Prussian company is, from the fact of its being three deep, smalier than that of those nations which habitually form their troops two deep, * * * it would appear desirable to reduce the size of the companies considerably below the Prussian standard. * * * It should be remembered that the Prussian company was the result not so much of tactical, as of economical motives. * * *

NECESSITY FOR CHANGE IN OUR SYSTEM OF INFANTRY DRILL.

Our war was the end of the muzzle-loading period; the Austro-Prussian war was the birth of the breech-loader; the Franco-German war opened all eyes to the necessity for open-order fighting; the Russo-Turkish war heralded the advent of magazine rifles as an offset to machine guns.

We can never again march solid first lines to the attack under heavy fire, as at Fredericksburg or Cold Harbor.

If the touch of the elbow, *id est*, the solid line, is to be instantly given up under fire, why retain it for manœuvre?

If the actual fighting in attack must be in open order, every man for himself, why burden his action with the restrictions of what he should do as number four of the front rank of a set of fours, in contrast with what he must do as number four of the rear rank of the same set of fours?

All authority recognizes the necessity for a firing line in open order, for replenishing that line and for assuring it of constant support; for pushing it ever onward, and consequently for guarding its flanks; for assimilating every-day practice to what takes place on the battle-field.

Authority also recognizes the desirableness of having men who are in a life and death struggle feel that their own well-known comrades are at hand, to reinforce and help them in a tight place, or to clinch a hard-earned success.

While it is deemed impossible to avoid the ultimate mingling of different organizations in the course of a protracted contest, it is possible to postpone such mixing, and even to confine it to fractional portions of a firing-line.

Every system of drill now seeks to enable a captain to handle his company without looking to some other organization for help at the first pinch.

We must start with this main idea; with another that the individual man need never be numbered; with a third that the man himself is a unit and not one-fourth of a unit; with a fourth idea that troops in any formation should be able to march with plenty of elbow and leg room, even in what is termed close order, and that they should be able to lie down in line or in column, at full distance or in mass; with a fifth idea that linear elasticity should not be confined tactically to skirmishers, but that extension or contraction shall be tactical with the main body also, varying between the touch of the elbow and *any* desired interval; with a

sixth idea that, whether a company be in line or in column, it should be able to deploy with equal facility; finally, when a lot of men "fall in," there should be no time lost in *calling off*.

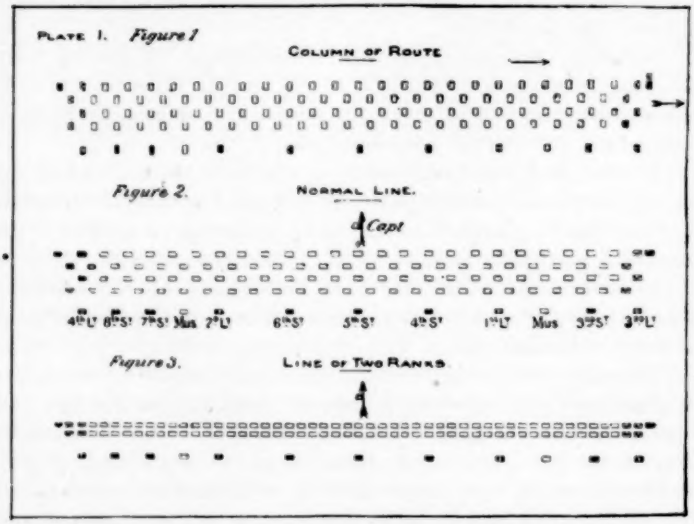
In the presence of many officers a hundred men were taken to represent a company on the war footing instructed in the proposed system. They were made to scatter, as a lot of tired men will do, and to lie down, as if on each side of a dusty road. Under such circumstances what becomes of a set of fours?

Three commands were given, timing their execution by the watch, viz.: to fall in, to deploy, and to begin the firing.

In one minute these one hundred men had formed in ranks, had deployed systematically one hundred yards to the front, and each man was in proper position firing.

OUTLINE OF PROPOSED SYSTEM.

In this system, the company and battalion manœuvres, in close order, are all substantially the same as in our present system. The deployment of skirmishers, however, is essentially different, and may be executed from any formation in line or in



column. It is also more simple, and, during its execution, on an emergency, the fire of one-fourth the force may be instantly opened, while the other portions are proceeding to their positions.

At the command *fall in* the company forms in four ranks, in what is termed the *column of route*. The distance from the back of one man to the breast of the next man in any one rank is fifty-six inches, but, if so ordered, it may be taken at thirty-two inches. The first rank is that which is farthest from the file-closers. The men in the second rank are each opposite the interval between the men in the first rank. The men in the third rank are respectively abreast of those in the first rank. The men in the fourth rank are abreast of those in the second rank. (Fig. 1.)

If the company be now faced to the left, it is in what is termed the *normal line*. (Fig. 2.)

All close order manœuvres for the company or battalion are performed in *column of route*, or in *normal line*, and each man has all the leg and elbow room he needs in marching.

The command *fall in* may be followed, without further ado, by the command to deploy as skirmishers, or to march at once to any point, or to stack arms, and no time is lost in counting fours.

A company or a battalion, at any moment while manœuvring at close order, can lie down without disturbing its tactical formation, in line, in column of route, in column at full distance, or closed in mass.

In what is termed the Company Field Drill the captain is a battalion-commander on a small scale.

Each of the four ranks has its assigned officer, non-commissioned officers and privates, so that each man in succession shall know when the obligation to exert authority falls upon him in the absence of his superiors, by casualty or otherwise.

The *normal line* forms *line of two ranks* by closing files to the front, the first rank standing fast, the men in the second rank stepping into the intervals in the first rank, the men in the third and fourth closing to cover their respective file-leaders. (Fig. 3.)

In *line of two ranks*, for firing, the rear rank takes a side step to the right, thus bringing each man opposite an interval in the front rank.

The line formation may have any extension, from the touch of the elbow, if desired, to three or more times the front. When thus extended the company can fire lying down, by file, by company, or by rank.

The manœuvres of the company in close order are so similar to the present system that it is not necessary to describe them.

The movements have all been practically illustrated on the drill ground.

For street fighting the first rank of the normal line advances in line; the second rank faces to the left and files to the right and will reply to any fire coming from the houses on the right; the third rank faces to the right and files to the left similarly repressing fire from the houses on the left; the fourth rank is in line ready to face about to protect the rear. Coming to a cross street, down or up which it is necessary to proceed, the company square faces to that flank, each rank performing the resulting task allotted to it.

In campaign, marching in column of route and a necessity arising for hurrying cavalry or artillery along the road, two ranks may march on the left of the road and two ranks on the right side without in the least interfering with the rapid and systematic deployment if suddenly called upon. Escort duty to a wagon train may be similarly performed.

COMPANY FIELD DRILL.

For this drill the captain notifies the company in order that the officers and men may don suitable field uniform.

Beyond thorough acquaintance with the methods of deployment but little of the important part of theoretical training can be accomplished on the parade ground. The captain, therefore, makes formal request, if necessary, upon proper authority for time and opportunity to exercise his company on suitable ground. He selects that which is broken and diversified, and he uses every resource to accustom the men to appreciate and improve the accidents of ground. He sets the example and requires his officers and non-commissioned officers to do likewise in showing indifference to personal discomfort, and he must be ready at all times to undergo the fatigue and exposure without which this course of instruction must fall short of its purpose.

The methods of deployment being learned, every movement thereafter should be for a definite purpose upon a position supposed to be held by or against an enemy and the men should be made to understand the object of what is done.

The officers and non-commissioned officers enforce the directions given by the captain for moving *on certain designated points* and for seeking every kind of shelter, pointing out such and compelling its proper use if not readily perceived by the men.

The colonel or other commanding officer requires the companies to oppose each other by approaching from distances of three thousand yards if attainable, for the purpose of habituating officers and men to the appearance of opposing lines at varying distances and affording those in each line a chance to judge of the efficiency of shelter used by their opponents and, from experience, to learn how best to effect a turning movement unobserved.

The commanding officer also requires all troops to practice the duties of advanced-guards, rear-guards, patrols, out-posts, etc., on ground suitable to show the use of such formations. He frequently requires two companies or two battalions to move out by different roads with orders to keep up their communication throughout the march, or to watch each other's movements as if made by an enemy.

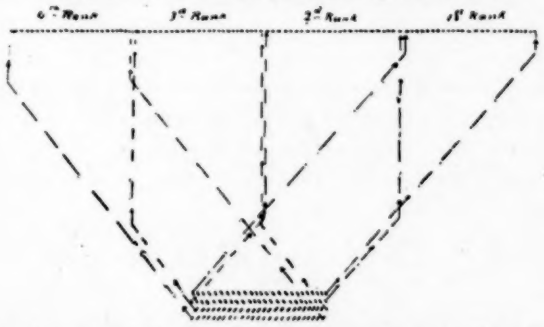
At the preparatory command for deployment, officers and sergeants take assigned positions in the several ranks.

The company deploys either from normal line or from column of route; forward or by the flank; all four ranks, or one rank, or more than one, as the captain desires. The chiefs of the several ranks give the necessary commands in the different deployments.

Plate II.

Company Field Drill.

Deployment from Normal line forward spreading from the centre.



Being in *normal line* to deploy forward, spreading from the centre, the first and second ranks oblique to the right, the third and fourth ranks oblique to the left, the first rank lengthens the step slightly.

As the third and second ranks disengage from each other,

they move forward by command of their respective chiefs, who place themselves wherever most convenient to superintend the deployment; the second rank shortens the step till the third rank is abreast of it; the first rank continues to oblique to the right until its left has disengaged from the right of the second, when the chief of the first rank moves it forward; the fourth rank continues to oblique to the left until uncovered, when its chief moves it forward. At the command *Halt*, all the ranks halt on the line occupied by the first rank.

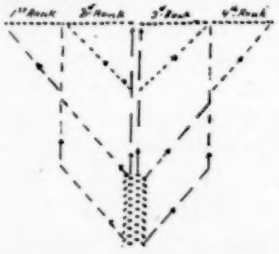
Being in *normal line* to deploy forward, spreading to the right only, the first rank moves straight forward, all the others oblique to the right, each moving forward when disengaged. The deployment spreading to the left is similarly performed by the left oblique.

The *normal line* deploys by the right or left flank, or by both flanks. When deploying by the right flank, the first rank stands fast, the others face to the right and successively uncover. The deployment by the left flank is similarly executed, the first rank standing fast. To deploy by both flanks the first and second ranks face to the right, the third and fourth ranks face to the left and similarly uncover.

The assembly is made on a designated rank, all the others moving toward it and taking their places in *normal line*. The individual man being the unit, it is a matter of no consequence that in reassembling the former right of a line has become its left, or the reverse.

Plate III.

Column of Route, deploying forward spreading from the centre, that is: right and left oblique.

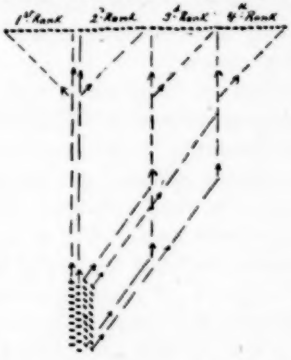


Being in *column of route* the company deploys forward, spreading from the centre. The two centre ranks move straightforward, the rank on the right obliques company distance to the right, the ran kon the left obliques company distance to the left. The two

right-hand ranks execute *right front into line;* the two left-hand ranks execute *left front into line.*

Plate IV.

Column of Route, deploying forward spreading to the right.



If it be desired to deploy to the right and not from the centre, the two left-hand ranks move straight forward; the two right-hand ranks oblique to the right, each moving forward when company distance from the rank next on its left; the left-hand rank executes *left front into line;* all the others *right front into line.* The deployment to the left is similarly executed; the two ranks on the right moving straight forward, the left-hand ranks obliquing to the left; the right-hand rank executes right front into line, all the others left front into line.

A *column of route* deploys on the ground it occupies by similar means by the right or left, or by both flanks.

The four ranks being deployed, "*the rush*" is executed by alternate ranks. At the command the first and the third ranks rush forward about twenty-five yards, throw themselves flat, if necessary, for cover, and open fire; the second and fourth then make a rush for about fifty yards, thus gaining twenty-five yards in advance of the first and third, which, in their turn, make the rush for fifty yards.

The line may be similarly retired, the several ranks protecting each other by their fire.

EMPLOYMENT OF RANKS.

These movements are to be practiced on the most diversified and roughest ground attainable and require that the officers

shall be able to appreciate and improve the accidents of ground for illustrating the object of any movement ordered.

To this end entirely new ground and a definite position supposed to be defended by an opposing force should be sought for attack, while officers and men are required to develop fertility of resource in assimilating their surroundings to what is likely to be experienced in actual service.

The essential object to be attained is to impress upon the soldier a sense of his personal responsibility and to encourage freedom of action. The tendency of all prescribed formations is to deprive the soldier of many opportunities for individual action by the oppressive idea that he must preserve a rigidly fixed order of sequence relatively to other men. It is to combat this idea and to habituate the soldier to what invariably takes place in war, which destroys the cohesion of units based upon serial numbers, that the men in this system are purposely *not numbered.*

The individual man is to have no rigidly fixed position in the ranks when *acting as a skirmisher*, and the chief of a rank when moving it to the assistance of a deployed firing-line, is not to confine it to marching in theatrical "single file," or to an attempt at a straight line. On the contrary, the chief may entirely break up such formations and perform his allotted task by the simplest means such as men naturally adopt when endeavoring to reach a given point under fire.

Any one rank is practically a group of comrades, and in advancing to the assistanee of a deployed firing-line the men may rush into a ravine or other shelter and from that to another more advanced ; making no attempt whatever at relative order of sequence in the rank, as no fixed order is intended.

The chief of a rank will practice his men in rapidly distributing themselves at customary distances in line, after grouping in some temporary shelter.

In the employment of ranks the captain detaches one rank, or two, or three, as he deems best, or as he may be directed.

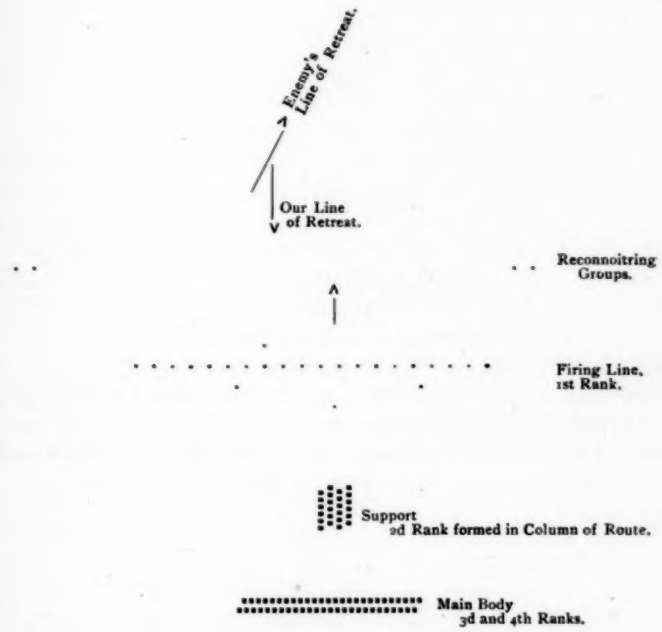
The captain frequently instructs his company as if it were an isolated command. That is he forms his first line which is composed of the firing-line, supports and main body; and the second line which is the reserve.

He also gives the first platoon to the senior lieutenant to handle precisely as he would a full company, and the second platoon to the second lieutenant to be similarly used. The two

platoons are to act as opposing forces, which enables each to judge of the efficiency of means adopted by their opponents. It is only frequent practice in the field which can teach the infantry officer to be prepared for the rough school of war.

The following gives an idea of the handling of a company as an isolated command opposed to one nearly equal or a little greater:

Plate V.


Enemy's Line of Retreat.
Our Line of Retreat.
Reconnoitring Groups.
Firing Line, 1st Rank.
Support 2d Rank formed in Column of Route.
Main Body 3d and 4th Ranks.

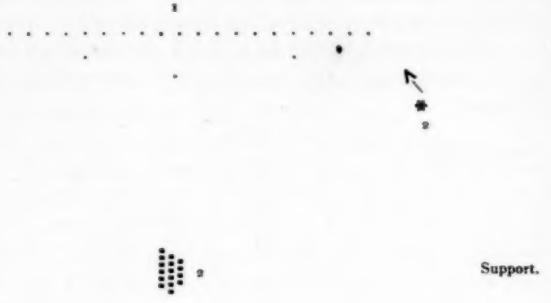
The first rank under the first lieutenant moves forward as the firing-line, the chief causing it to extend intervals if necessary.

The chief of the second rank forms it into *column of route*, thus constituting a small company to be handled as such if circumstances require, its several ranks being commanded by its own sergeants and corporals. With this as *the support*, the chief marches it in normal line, or in column of route, or in separate groups at about 150 yards in rear of the firing-line.

Coming under supposed fire, casualties occur in the firing-

line, men designated by name fall out and the others gravitate toward the centre.

Plate VI.



The chief of *the support* at a signal from the chief of the firing-line sends forward his first rank under the sergeant to reinforce the firing-line; the sergeant causes his men to rush into shelter forward; from that to another point; and finally joins the firing-line on its flank. As necessity arises the support sends forward its second rank to the flank most in need.

Plate VII.

The support meantime takes every advantage of cover while endeavoring to get nearer and nearer to the firing-line, and the chief endeavors to throw his remaining two ranks around the flanks of the supposed opposing line.

The captain disposes of his reserved ranks as he judges best, keeping them during the first period of the approach about 200 yards from the support.

As the firing-line becomes heavily engaged the captain endeavors to bring up his reserved ranks nearer and nearer.

Plate VIII.

At the opportune moment the captain detaches one of his reserved ranks to work rapidly around the flank and orders the final assault, retaining the last rank as a last reserve with which he personally pushes on to the position.

The assembly is then sounded and the company is reformed in *column of route* with the utmost rapidity and prepared for orderly manœuvre. The captain stations himself to indicate the head of the first rank, the men close up taking the nearest vacant place in any one rank regardless of former positions. For the temporary and rapid formation it is a matter of no moment that any one rank for the time being shall have a few more or a few less men than another rank. The essential object is rapid concentration to resume control and order.

Great latitude is given to the captain for the choice of methods in which to handle his company. Judgment founded upon experience is to be his guide. No set rules are allowed to interfere. The uses to which the several ranks may be put and the formations to be adopted are limited only by the captain's views of the necessities in each case.

BATTALION FIELD DRILL.

A battalion should never be so dispersed that it cannot promptly obey its own commander.

Were the battalion to deploy the four ranks of each of its four companies, there would be a lateral extension of over 750 yards to be directed and controlled by the voice of one man. All experience has shown this to be impossible in the tumult of a fight.

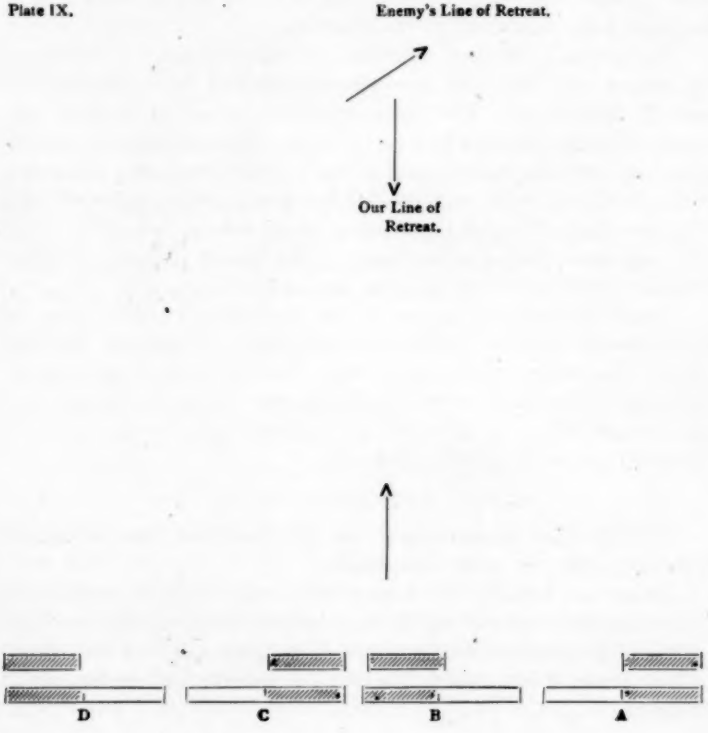
From 100 to 250 yards are taken as the extent of front that ought to be assigned to a battalion of four companies according as it is to form its own firing-line, supports, main body and reserve, or to depend upon another battalion as the reserve. This can be done giving to each company commander the opportunity to manage his own company, to support his own firing-line and to establish it in its entirety several successive times, before being compelled to call upon another company to fill the gaps on his flanks caused by casualties.

It would take too much time and space to describe the different deployments of the battalion as skirmishers.

They are made from line or column, but the cases must be exceptional where an entire battalion is deployed.

The rule is that the battalion commander forms his own firing-line, supports and main body, and if he have an isolated command

Plate IX.



he also forms his reserve. He is necessarily controlled by circumstances and he cannot be governed by explicit directions.

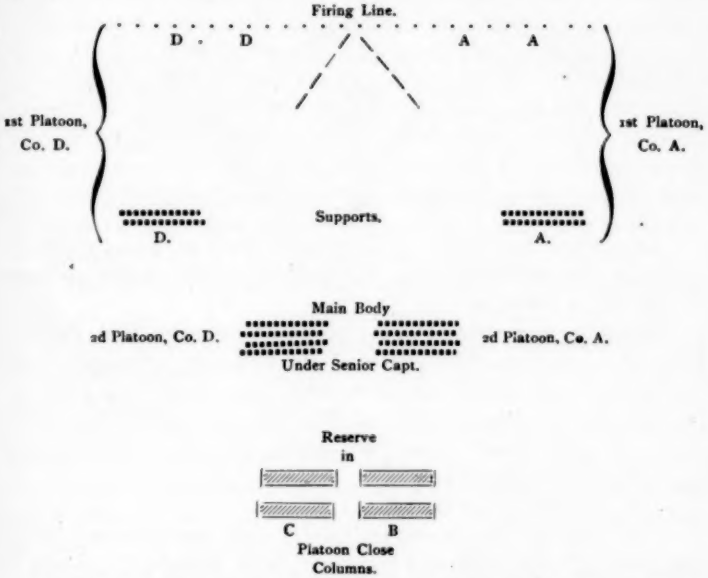
The several means of deployment and the use of companies are described more as suggestions than as guides.

The following example is given in illustration:

The battalion is an isolated command in line and it is determined to attack a certain position. (Plate IX.)

The battalion forms platoon-close-columns, the rear platoon of each company being close to its leading platoon. The line advances in this formation; the two centre columns are near each other, the two flank columns are each out some distance.

Plate X.



At the proper time the battalion halts; the two centre columns stand fast; the companies on the flanks advance for 150 or 200 yards, the senior captain in command; by his command each rear platoon of these two companies halts, the leading platoons continuing the advance. These having reached a position 150 yards in advance, the third and fourth ranks of each are halted, the first and second ranks are moved forward and deployed 150 yards in front.

Thus the firing-line, supports, main body under senior captain, and reserve under the battalion commander are in position and the *forward* is sounded.

As the firing-line becomes heavily engaged it is reinforced on its flanks by the supports.

A success on the right which is pushed home aided by the approach of the right platoon of the main body is offset by an attempt at an overlapping movement by the enemy on the left.

Plate XI.

All of the left platoon of the main body is hurried to the left to resist this movement, and one platoon of the reserve is sent for the same purpose.

The right company of the reserve has sent its first platoon forward to reinforce the centre of the firing-line; the remainder of the reserve is still held well in hand.

Seeing the enemy foiled on the left this remainder of the reserve moves rapidly upon the centre without deploying, and the whole line is carried.

The assembly is sounded.

Each captain stations himself to indicate the point where his company will assemble and the men form rapidly in column of route.

THE FIRINGS.

The foundation of fire discipline is instant obedience to the command *Cease firing*. As it is the most difficult end to attain in the fury of fight, so is it to be most carefully and systematically taught until it becomes an instinct. It insures controlled fire, and the pause steadies the men. At Gettysburg rifles were found on the field with ten or twelve loads in the barrels. This cannot

happen with the breech-loader, but it shows the necessity for fire discipline with any arm.

The most noticeable fault is failing to lower or raise the rear sight, as the range changes. Many of the English rifles that were picked up on Majuba Hill were found, at the last moment when the Boers were closing, sighted to 800 yards. This, being due to excitement and desire to increase the rapidity of fire, is best counteracted by enforced pauses in the fire.

The practice of uncontrolled fire, that is when each man judges for himself as to range and choice of objective and time for firing, should not be allowed even at drill; for once begun in actual fight it degenerates into a wild fusilade which stops only for want of ammunition, and meantime neither trumpet, or whistle or word of command would be heard in trying to effect a desirable movement, such as passing from the defensive to the offensive.

Controlled fire is that in which each man fires the number of cartridges ordered, at a designated objective, and with the elevation of sight directed by the officer in command. The control rests primarily with the chief of the firing-line and through him upon the officers and non-commissioned officers employed on this line. The chief selects the objective upon which to concentrate the fire, determines whether that fire shall be by file or by volley from each rank and names the distance and number of cartridges to be used.

The chiefs of the several ranks and their non-commissioned officers enforce obedience and see that the fire is not diverted from the objective selected.

After the command *Cease firing*, the pieces are not loaded unless the command to load is added.

With discipline, volley-firing becomes possible and is especially useful with infantry selected to assist artillery fire in preparing the way for the advance.

The *School of the Regiment* corresponds to our present Evolution of the Brigade.

The *Field Drill of the Regiment* merely applies to three battalions, the principles which govern one battalion.

CONCLUSION.

The foregoing is only a rough outline of some of the essential features in which the drill proposed differs from the present infantry tactics.

It is, of course, impossible to devise a plan which will meet every requirement and answer every objection, but it is claimed that this system will meet many of the requirements of modern war for the infantry arm, such as can be deduced from careful study of acknowledged best writers upon this most important and growing subject.

Large companies on the Prussian plan make company columns a necessity. The increasing power and accuracy of artillery fire, the perfecting of machine guns and the effect of magazine rifles make the company columns matter for debate which will not close until the next great war.

Meantime it is necessary to make our own small companies as efficient as possible, and the first step is well taken in our greater proportion of officers which foreign services cannot afford.

The death of General Upton was a national calamity. With the prestige of his name and with his mastery of the subject, we would have had to-day a system the wisdom of which all would acknowledge. General assent would have been a powerful element of success. Without his guiding hand we are groping somewhat in the dark.

In the prosecution of the work herein outlined there have been located many shoals and dangerous reefs, and in seeking to avoid these there have been disastrous discoveries on the other quarter. After repairing damages it may be that it is not all plain sailing in the course laid out.

Each officer should read all he can get hold of on this subject, to enable him properly to form an opinion. Then, in any contemplated work, it is earnestly hoped that among the well-considered efforts of so many who have written on infantry instruction these suggestions may be found of some assistance.

THE DEVELOPMENT OF SUBMARINE MINES AND TORPEDOES.

By FIRST LIEUT. JAMES C. BUSH, U. S. A.,

Fifth Artillery.

(*Continued from Journal No. 43.*)

V.

THE change from many small guns to few large ones, in coast defense, has vastly increased the importance of making every shot tell. For this reason the subject of range-finding has received much study of late years, and many devices have been presented for trial.

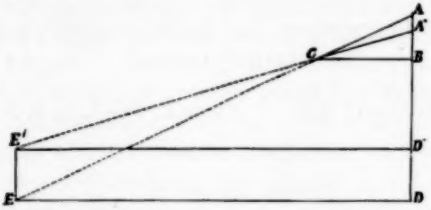
The demands of the submarine defense are equally exacting in this particular, especially in those countries where dependence is placed upon enormous charges fired by observation. When mines are fired by the observation of *one* operator, they must either be moored between marking buoys and exploded when a vessel is seen to lie between them, or the observer must be at such an altitude above water-level that the instrument employed will indicate correctly the relative position of ship and mine. Such an instrument is said to be worked by depression, and this method would be simple enough were it not for the adjustments rendered necessary by alterations in tidal level.

One of the first instruments employed for this purpose, designed by Major Watkins, R. A., was a development of his well-known depression range-finder. Later Major Watkins invented an excellent instrument of comparatively simple construction, which has been adopted in the English Service.

The theoretical considerations underlying the construction of all depression instruments that possess a correction for alterations in tidal level, is shown on the figure.

Where A C represents the telescopes collimation, B C the horizontal scale employed, D E the water surface, A B the scaled height of telescope, A D its actual height above water-level. If the latter be altered to D′ from a tidal rise, or A D decreased to A D′, then, in order to obtain a tidal correction in the instru-

ment, A B must be proportionally decreased to A′ B, and if A′ and E′ be joined, they will still pass through C, the length C B still indicating the distance of the mine E from the vertical A D.



The inherent defect of all depression instruments, whether for finding range or for plotting the positions of objects on a chart, consists in the difficulty encountered in finding visually the water line of the object observed.

At night it is especially difficult to see the water line of a black hull moving through water that also appears black, and if the vessel move fast, the bow wave and wave of depression behind, make it almost impossible to discover the true level of the water line.

"It has been proposed to employ depression instruments with a command of about 60 feet. With such a command, an error of one vertical yard in taking observation causes an error in range of 45 yards at 1000 yards, if the error be downwards, and of 52 yards if it be upwards.

"As large mines cannot conveniently give more than 30 feet radius to the circle of observation, or 'strike,' it appears that depression instruments, however perfect in themselves, should not be employed when the command does not exceed 60 feet." (Bucknill.)

Assuming that the instrument must be effective at night, and taking into consideration the fact that the observed vessels will probably be enveloped in smoke; that their water lines will be frequently invisible, and will often have to be guessed at from short glimpses at the remainder of the hull, Bucknill concludes that depression instruments do not possess sufficient accuracy for firing mines singly during the smoke of an engagement.

It is, perhaps, well to explain that Colonel Bucknill advocates, to a greater extent than most authorities, the use of observation mines fired by judgment, and that he insists on planting his mines in groups or lines radiating from one of the triangulation

stations even to distances ranging from one to seven miles. There is high authority for believing that such precision in planting, for mines with a "strike" of only 38 feet, is unattainable, especially in deep water.

Adepts in England do not as a rule appear to share Colonel Bucknill's opinion in regard to depression systems, and for several years firing by double observation has received but little attention. Where extreme accuracy is demanded, there can be no doubt that the method of double observations is the correct one, and in low sites no other means than horizontal angles with a long base, or a very delicate and costly instrument with a short base, is practicable.

The objection to firing by cross-intersection consists in the liability of the two men to observe different ships or different parts of the same ship. But the employment of the electric search light facilitates matters very considerably, a rule being followed that the two observers should sight on that vessel which is illuminated by the ray and stick to her as long as the light remains; also that the centre of the foremast should be the point of observation—the mast of a vessel being seldom obscured by smoke. The simplest outfit for this purpose consists of a pair of good theodolites, with proper electrical apparatus, and an accurate map divided into squares of about 50 feet on the edge.

Should the electrical position finder, invented by Lieut. B. A. Fiske, U. S. N., fulfill all it promises, the problem will be practically solved for submarine mines—though present indications seem to point towards an error considerably greater than 30 feet at 2000 yards.

VI.

"As to the utility of the electric light in channel defense, a better idea can be formed after it has been more fully tried in war. Before firing begins it will doubtless be very useful, but as soon as the air becomes obscured by smoke from the guns or from smoked balls burned for the purpose, experience leads to a doubt as to its value. It will be most useful in clear dark nights; in bright moonlight, and especially in fogs, little dependence can be placed upon its assistance." (Abbot.)

Some English experiments seem to show that in the smoke of a night engagement the light is reflected back, throwing out the fort and guns in relief.

The usual disposition of the apparatus in a fortress is to place

the engines and dynamos in bomb-proof casemates and to throw the beam from stations near the water-level, either directly or by reflectors, according to circumstances. Stations should be duplicated and placed near the flanks of the position, to avoid smoke driven by the wind.

Obstructions: Just as mines themselves form a grand obstruction to the passage of large vessels and thereby assist greatly in the defense, so smaller obstructions can be usefully employed in resisting attacks upon the mines. Nets to foul propellers are too well known for discussion.

"As a defense against attempts to grapple the cables, whether made by drifting rafts or by ordinary steam-launches, or small boats, a few hawsers anchored in front of and among the mines will certainly be found useful. They should be attached to the heavy anchors or blocks of stone used to hold them in position, by short lashings, to prevent them from being drawn under the mud."

"Multiple cables for mines soon bury themselves by their own weight in the soft bottom of many of our harbors; and as a harmless hawser can only be detached by raising it, the enemy must either lose time in so doing, or if use be made of explosive grapnels, he will be led to overestimate the damage he is inflicting."

VII.

Nothing has caused greater diversity of opinion in naval circles in all parts of the world than the subject of Torpedo Boats. Their rapid development is almost phenomenal in the history of a particular industry, especially one which has only been in operation for some fifteen years.

Sleeman divides these boats into four classes: Hunters, Division, Harbor and Ship boats. The first, as its name implies, is a special form of vessel created for hunting and destroying hostile torpedo boats. When its armament consists of quick-firing and machine-guns only, it can hardly be called a torpedo boat; generally, however, it has a torpedo, and in any case is a function of torpedo warfare.

The "Division," or sea-going class, includes those which, by their size, are capable of acting independently at sea, a certain number being attached to each division of a fleet—hence the name. It becomes difficult to draw the line between these and the Hunters, when the latter have the combined armament.

They range from 135 feet in length and 100 tons displacement upwards, but naval opinion seems to point towards relegating the larger boats to the work of coast defense.

A "Division" torpedo boat built recently by Messrs. Yarrow & Co., England, had the following dimensions:

Length over all	135 ft.
Beam at water line	14 ft.
Depth	9 ft. 2in.
Displacement (loaded)	130 tons.
Speed	23 knots.
Coal endurance at 10 knots	4000 knots.

Turning circles, going ahead to port 90 yards in diameter in 60 seconds, to starboard 110 yards in 65 seconds. The hull is subdivided by bulkheads into eleven water-tight compartments. Two torpedo tubes for delivering a beam fire are placed aft, while a third tube is built into the stem forward for end on fire. The gun armament consists of five quick-firing 3-pdr. guns.

Boats of the Harbor class are intended for harbor defense only, and include all those too large to be carried in ships and too small to effectively fulfill the duties of division boats.

They are provided with electric search lights, torpedo tubes, and machine-guns.

It is generally conceded that the submarine mine defense should be supplemented by these boats. This is recognized in our own country, as shown by the recommendations of the Coast Defense Board, who include torpedo boats as necessary adjuncts to all proper harbor defense. Indeed, a port with the peculiar features of San Francisco can hardly be defended by other means than guns, torpedo tubes, locomotive torpedoes, and torpedo boats.

The Ship class include the largest sized boats that can be conveniently carried on ship-board.

The qualifications of each class are very similar, differing mainly in degree, and are as follows: Speed, with due regard to durability of engines and boilers; handiness in manœuvring; coal endurance; sea-worthiness; proper size, including habitability and suitability; suitable armament of torpedoes and guns; proper protection for engines, crew, etc.

The factor of speed forms, of course, one of the most important essentials, but the question is being seriously debated in naval circles whether too much importance has not been and is

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not now being attached to this factor, to the possible detriment of some other equally important one, such as durability, for instance.

In the English race of 1887, when 22 of these craft competed over a 100 mile course, seven were placed *hors de combat* through machinery accidents and one by loss of a propeller blade.

All require the most perfect development of the property of handiness, *i. e.*, the power of rapidly answering the helm.

The actual vulnerability of any torpedo boat has never yet been determined, as this factor applies not only to the vessel but also to its torpedo equipment, its officers and crew, particularly to the commander and engineer.

The armament may consist of both torpedoes and quick-firing or machine-guns; all are, however, provided with the former, which are of greatest importance as the effectiveness of the torpedo is the actual measure of the power of the torpedo boat.

"It is now possible to obtain a torpedo boat having a speed of from 25 to 28 knots per hour, a coal endurance represented by a run of 5000 knots at the rate of 10 knots per hour, and capable of turning at full speed a complete circle of a diameter twice the boat's length in about a minute. Her mode of attack, however, is of such a nature (Whitehead torpedo) that she must be brought to within 500 yards of a hostile ship to enable her to deliver a blow with even a hope of success. Now, in these days of quick-firing and machine-guns and electric lights, her chances of coming out of action unharmed will be very few, while the chances of her being severely damaged will be very great, and her destruction even possible, before she has fired her torpedo.

"It would seem a matter for serious consideration to seek for some form of torpedo which shall give to the almost perfect torpedo boat of the present day a power of aggressive action more capable than the present weapon of bringing all the excellent qualities of this vessel into play, and at the same time without obliging her, whilst delivering the attack, to become dangerously exposed to the enemy's fires." (Sleeman.)

VIII.

The idea of a submarine or submersible boat for war purposes has been before the world for over 200 years. During this long period almost every conceivable method of submersion and propulsion has been proposed or actually tried, but until a very

recent date the history of this boat has been one of failure and disaster.

In our Civil War a submarine boat was certainly effectual in sinking a ship—in which operation she was also lost.

In England the *Nordenfelt* has been successfully operated, while Russia possesses a number of *Goubets*, France has the *Gymnote*, Spain the *Peral*, and in our country we have the *Tuck* and *Holland*.

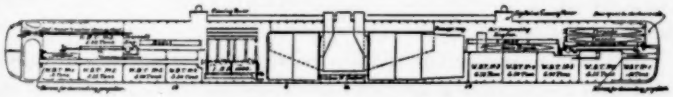
An electric motor supplied from storage batteries furnishes the propelling power of the *Goubet* which is of the sinking type, the submergence being caused by water admitted to reservoirs. The boat is small, only thirty-three feet in length, and has a speed of five knots. It carries a small torpedo which when released rises to the surface and explodes by electricity.

The *Gymnote* belongs to the diving class. It accomplishes this diving after the manner of the Whitehead torpedo, by means of horizontal rudders worked by hydrostatic pressure or at will. The power is electricity. Armament not determined.

Little is known of the Spanish electric boat *Peral*. The estimated speed at surface is 11 knots, and 10½ knots submerged.

The *Holland* (diving-type) has a petroleum engine, air-compressing machinery and a 10-inch pneumatic torpedo tube with a range of 1000 yards over water and 200 yards under. Speed 9 knots.

The *Tuck* electric boat has a combined action. A horizontal rudder at the stern causes her to dive when in motion while a propeller acting vertically draws the boat beneath the surface. Water admitted into compartments provided for the purpose also causes her to sink. All these have a very similar shape approximating that of the cigar.



NORDENFELT SUBMARINE TORPEDO BOAT.

The *Nordenfelt* boats (combined type) have demonstrated their efficiency and safety most conclusively in official trials, their capability and utility for naval warfare remain to be proved. They have steam propulsion, the usual propeller astern, and a horizontal propeller at each end for giving submersion. The machinery consists of a pair of double-cylinder vertical com-

pound engines, 1000 H. P., which propel her 15 knots per hour at the surface and 5 knots below water. Two steel conning towers surmounted by glass domes stand about two feet above deck and supply a means of look-out when the boat is sealed up.

The last one built has a length of 125 feet, 12 feet beam, a circular midship section and wedged-shaped ends. Two Whitehead discharging tubes placed in the bow supply her armament. When the boat is a-wash, brought about by filling water-tanks, she floats with only the conning towers in sight. She has never less than half a ton reserve buoyancy, with 50 feet submergence. The crew consists of a captain and eight men.

"The property of being propelled when wholly submerged, though a distinctive and important feature of submersible boats, has been commonly and erroneously treated as the sole object of their construction, instead of merely a means to an end." "The value of the submarine boat would be greatly enhanced as a torpedo boat, by possessing the power of running at full speed while partially submerged. It is now generally accepted that the condition of total submersion should only be resorted to under certain special circumstances such as defending itself against the attack of surface boats."

If driven beyond a speed of five knots, while submerged in deep water, there is much risk of the vessel being caused to dive to a depth beyond the strength of the hull to resist, before the corrective forces could direct her upward; and owing to the comparatively small amount of reserve buoyancy there is danger that the boat may be compressed so much as to seriously reduce its displacement.

In shallow water she runs the risk of being driven on the bottom and held there. A further danger attending full speed when submerged, results from the impossibility of discerning objects right ahead.

"It would seem, therefore, worthy the attention of naval architects to devise a torpedo boat capable of running at its highest speed whether on the surface or *partially* submerged, and give up the idea of total submergence." (Sleeman.)

IX.

The spar or outrigger torpedo is the simplest form of submarine offensive weapon extant, and as a manned boat or ship carries it to the point of attack, it must be considered as pos-

sessing the feature of controlability in the most absolute manner.

It has, however, one insuperable defect, lack of range, and in these days of quick firing guns a ship can repulse the attack if prepared to meet it.

This torpedo came prominently into notice during our Civil War, when the power of ship defense was relatively very much smaller than the comparative capabilities for attack then and now. Since that war the power of ship defense has developed far more rapidly than the means of attack by the spar, thus causing a demand for a submarine weapon possessing the power of delivering its blow at a distance from the operating point. This is the only offensive weapon which has stood the test of actual service with much show of success, the exploits of Cushing and Davidson in America, of Dubasoff and Shestakoff on the Danube, having clearly proved its worth under the conditions then existing.

On account of its lack of range the spar would in all probability have been expunged from the list of naval weapons but for the successful issue of its employment by the French in Chinese waters in 1884.

"These French successes unquestionably show that under certain conditions this weapon will prove most effective, as for instance, in the attack of a ship at anchor unprovided with any kind of external protection and where by the absence of proper look-out the torpedo boat can get close up before being observed.

"For clearing away booms and other obstructions placed across a harbor or river mouth the spar will find useful applications, and it has the merit of cheapness, simplicity and ready adaptation to any ordinary service boat."

The introduction of the higher explosives in place of gunpowder, the use of steel instead of wooden spars, the adaptation of electrical ignition in place of mechanical, and the development of the fast steam torpedo boat have together combined to greatly enhance the value of the spar torpedo as a weapon of offense in the present day.

X.

At the present time there are before the world a multitude of inventions of different kinds of torpedoes, all coming under the category of controllable or uncontrollable varieties. A few have received regular adoption, some have failed to realize the expec-

tations of their originators under the crucial test of official trial, and others are but just emerging from the difficulties inherent to the realization of a theoretical conception in actual practice.

The employment of these torpedoes in batteries, specially constructed for them, has often been recommended for the defense of narrow channels, entrances to harbors, etc., and this method has been adopted by some nations in certain favorable situations.

The Whitehead (uncontrollable type) forms part of the armament of so many nations and has received so much attention for a long period of years that it has probably been brought to the highest state of efficiency obtainable.

The Swartzkoff-Whitehead, the outcome of the purchase of the "secret" by the German government, differs from the true Whitehead mainly in the material of construction, the latter being of steel while the Swartzkoff is of "phosphor-bronze." The case has a length of 14½ feet, a circular cross section of 14 inches diameter, and pointed ends. It weighs about 600 pounds, carries about 70 pounds of explosive, and has a speed of 27 knots for a range of 400 yards. It is propelled by two screws one abaft the other, working in opposite directions and driven by a Brotherhood three-cylinder engine and a reservoir of highly compressed air. A regulating valve causes the engine to be driven at any desired speed.

The charge is carried near the head, which has an exploding apparatus, brought into play when the torpedo strikes the side of a vessel. The immersion is regulated by horizontal rudders at the tail, actuated by compressed air and governed by a valve itself controlled by hydrostatic pressure due to immersion. Vertical fins regulate lateral direction by permanent adjustments made in accordance with experiment.

The Whitehead is ejected by compressed air or by the explosion of a small charge of gunpowder (Canet system); the directing tubes, carriages, or other apparatus varying according to the conditions of each situation, such as under-water or over-water discharge and front or broadside discharge.

They can also be discharged by gravity, like the ball of a falling pendulum, release being effected at or near the lowest point of the fall, or by running down an inclined parabolic surface. "This last method appears to be specially favorable for employment in shore batteries."

The below-water discharge has the advantage of affording protection to the men as well as to the weapon itself, while the torpedo is less deflected on entering the water, but it has the disadvantage of not permitting the training of the launching tube, the direction being given by the helm of the vessel.

Above-water discharge labors under the defect of being liable to disablement, or to the premature explosion of the torpedo, by the enemy's fire; and on account of the variability of the height above water, caused by the rolling and pitching of the ship or boat, the direction of the torpedo becomes uncertain after entering the water.

The defects of this weapon are:

Inefficiency due to the small charge carried, uncertainty as to accuracy—for, although a vessel can generally be hit at 300 yards range this cannot be depended upon; expense—they cost over $2500 apiece; intricacy due to the quantity of highly finished and complicated machinery; difficulties in manipulation—requiring great intelligence on the part of the personnel combined with long and careful training.

It requires constant care and attention to keep the mechanism clean and efficient—though this has been overcome in the Swartzkoff. The phosphor-bronze renders it possible to keep the weapon in perfect efficiency for many weeks without taking it apart for cleaning or readjusting the various delicate mechanisms.

The uncontrollable torpedo invented by Captain Howell, U. S. Navy, has a general design and outward appearance very similar to the Whitehead. The most important novelty is the motor, which consists of a ponderous gyroscope on a horizontal axis across the centre of the case.

A torpedo 8 feet long, 13.3 inches in diameter, carries 70 lbs. of explosive and a fly-wheel of 110 lbs., the whole weighing 325 lbs. The fly-wheel is spun up to 10,000 revolutions per minute, which results in half a million foot pounds being stored in the motor.

"The fundamental principle upon which the steering of this torpedo is based, is, that if a revolving fly-wheel be acted upon by any force which tends to turn it about an axis not parallel to its own, there will be a resultant motion about an axis perpendicular to the plane of these two. This offsets and opposes lateral deflection of the torpedo, and compels it to travel in the course in which it was originally pointed or launched."

"The axis of the fly-wheel being horizontal, any extraneous force tending to deflect it laterally will cause the torpedo to roll, which rolling can be conveniently employed to bring into action steering mechanism arranged to apply automatically an opposite deviating force." A regulator governed by the pressure of the water automatically controls the diving.

Most of the defects enumerated for the Whitehead have been overcome in the "Howell," which has the advantage of inherent directive force, heavier charge in proportion to total weight, smaller size, simpler mechanism and less cost.

If used for harbor defense, these torpedoes could be placed in shore batteries or mounted on some floating body and moored under the shelter of the land or a fort in a convenient place for aiding the defense.

By such means a foe would be kept in ignorance of the position from which his vessels might be torpedoed should he attempt to force a passage.

In accuracy of flight the uncontrolled torpedo compares very unfavorably with a projectile fired from a gun; the former lacks the speed and rotation of the latter and is besides subject to far more serious causes of inaccuracy, due in large measure to the greater density of the medium through which the torpedo must pass.

XI.

For many years it has been seen that a successful controllable torpedo would find useful employment in certain situations for harbor or river defense, and its more sanguine admirers believed that it might become an important naval weapon, but at present the best-known forms seem to find no favor in our own or other navies.

The Lay, the Sims-Edison, the Nordenfelt, the Patrick, the Lay-Patrick and the Brennan have received most attention. The Lay and Patrick are propelled by compressed carbonic acid gas, the Sims-Edison by electricity generated at the base of operations, the Nordenfelt by electricity carried in the torpedo, and the Brennan (locomotive type) by a powerful winding engine stationed on shore.

The rapid unwinding of two wires from two drums or reels carried in the interior of the Brennan torpedo, each drum connected to one of two propeller shafts, causes the propellers to revolve at a high rate of speed and consequently forces the tor-

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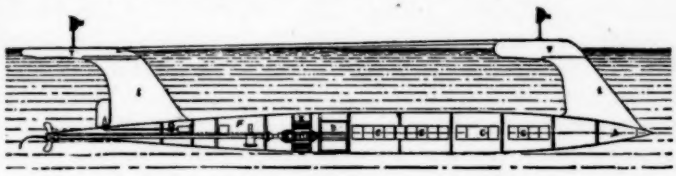
pedo through the water by the difference between the retarding strain on the wires and the forward thrust due to propeller action; considerable interest has been shown regarding this invention because of the apparent paradox involved in this mode of propulsion—namely, that the harder it is pulled back the faster it goes ahead.

The varying tension of the two wires is utilized for given lateral direction, while two automatic bow rudders, actuated by hydrostatic pressure, govern the immersion.

Phosphorus or Home's light mixture, each emits flame and smoke in the track of the torpedo when brought in contact with water, is carried in a small receptacle near the head of the torpedo and utilized for observing the course. It has a range of 3000 yards, a speed of 20 miles per hour, a length of 25 feet, pointed ends and carries about 200 pounds explosive.



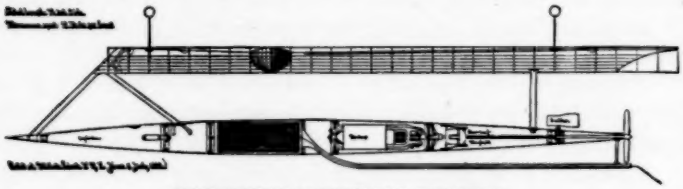
NORDENFELT ELECTRICAL TORPEDO.

The Nordenfelt (auto-mobile) has a form similar to the Brennan but, being buoyant, obtains its immersion by means of weighted fins of special form which permit the torpedo to charge under booms and such like obstructions.

The Nordenfelt possesses peculiar interest by reason of its mode of propulsion—electrical power developed within the torpedo itself. This alone constitutes a marked difference between it and all others of this type, and is the outcome of the development of electrical accumulators or secondary batteries in connection with the propulsion of boats. It carries about 300 lbs. of explosive, is steered by electricity and has a speed of sixteen knots for a 2-mile range.

The Patrick, also "self-moving" (carbonic acid gas-engine) and controlled by electricity, obtains its submergence (about 4 feet) by means of a fusiform float which supports the torpedo, also fusiform. The "Patrick" is a development of the Lay torpedo, which began to assume practical shape some sixteen years ago, and after improvement by Mr. Height became, by still

further improvement, the present "Patrick" torpedo. It has a length of 42 feet, a speed of 22 miles per hour, weighs 7300 lbs., carries 200 lbs of explosive and 8400 feet of cable.



SIMS-EDISON ELECTRICAL TORPEDO.

The Sims-Edison torpedo (locomotive type) consists of a hull or float filled with cotton rendered impervious to water which supports the torpedo (3¾ feet beneath) by means of braces; the foremost one slanting upward and backward enables the weapon to dive under floating obstructions.

A dynamo on shore, worked by steam power, generates the current which drives the propelling motor in the torpedo through the medium of a cable wound within the torpedo case. This case has a circular mid-section and conical ends. The rudder is worked by two electro magnets operated by a portion of the main current. The current required to drive the new motor, recently tried, has an E. M. F. reaching in some instances 1300 volts. The torpedo itself is smaller and the float longer than the old one and better adapted to high speed.

A most severe and exhaustive series of experiments with this torpedo have been carried out under the direction of General Abbot, Eng. Corps, resulting satisfactorily, except in the matter of speed.

Later improvements in the motor and shape of the float have produced, in recent trials under Colonel King, Engineer Corps, a speed of 19 miles per hour.

The torpedo carries about 200 lbs. of explosive, weighs about 1½ tons, has a length of about 30 feet and a little over a mile range.

"The sphere of action of the locomotive torpedo (Sims-Edison and Brennan) is limited by the length of cable carried, as it must be worked from a fixed point; and while the motive power is practically unlimited as to time, yet the actual range of action depends on the distance it can be readily observed by the operator who controls it. In the daytime this would not be further

than 3000 yards, while at night, though lights may be used, yet the distance at which the attacked ship could be seen, unlighted as she would be in war time, would limit the distance to about 1000 yards."

"The sphere of action of the auto-mobile-type, Patrick and Nordenfelt is, on the other hand, practically unlimited, as they can be worked from any point on shore or afloat, while they could also be towed out to sea under cover of darkness and attack a blockading fleet or ship from seaward. In combination with a submarine boat their effectiveness would be immensely increased and the combination would unquestionably form a most deadly and sure mode of attack." (Sleeman.)

"While it is not probable that any known form of controllable torpedo could be successfully operated in a heavy sea, it is probable that in a moderate sea-way and with waves 2 or 3 feet high, the torpedo could be guided as far as it could be followed by the eye of the operator.

"The range (1.5 miles) could be increased, but it is already about as great as could be utilized, on account of the extreme difficulty of following up the torpedo, and judging of its position with relation to the vessel it is sent after, even in smooth water. Seeing two large vessels at a mile and a half distance, and not in line with the observer, approach each other, it is very difficult to tell without instruments whether they will pass to the right or left of each other, and with nothing but two small flags visible, as is necessary in case of a controllable torpedo, the problem is even more uncertain. With an elevated point of observation this difficulty may be in a measure overcome and a longer range be practicable." (*Col. King: Report on experiments with Patrick torpedo, 1889.*)

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The idea of projecting torpedoes to a distance by means of artillery is old, and a proposal to employ mortars for this purpose was brought forward officially in England some years ago, but experiments were not recommended, high angle fire from mortars being considered too inaccurate for the purpose.

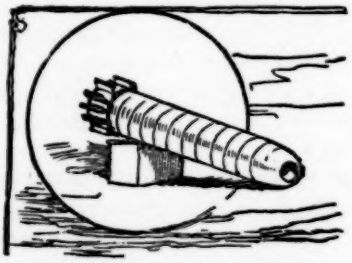
In 1883 Mr. Mefford, of Ohio, produced an air tube for throwing shells charged with high explosive. Capt. E. L. Zalinski, U. S. Artillery, took up the invention, and it has since been developed largely by him and by Mr. Merriam, whose fuse attained such marked success in a recent trial. An arm of great efficiency

and accuracy has resulted in completely vindicating the theories held by the advocates of air propulsion for ærial torpedoes.

The ballistic properties of the air tube are not sufficiently appreciated by many. In the first place, owing to the size of the air reservoir, the pressure exerted on the base of the torpedo is nearly constant throughout the entire length of the bore, and owing to the certainty with which the air pressure can be regulated, it is peculiarly well adapted for discharging torpedoes filled with detonating compounds. Again the accurate manner with which range can be altered by altering pressure instead of elevation is an important factor in its favor.

The pneumatic torpedo projector is too well known to require detailed description, and consists mainly of a light tube with suitable support and a breech mechanism containing a balanced valve so arranged as to open and close by a single movement of the operator. The time of opening and closing can be varied by an adjusting device so that any desired loss of pressure will ensue. In this way the range can be changed without change of elevation. Two reservoirs supply compressed air; one a "storage reservoir," receives the air from the compressor, and the other the "firing reservoir" supplies it directly to the tube. The latter has a capacity about five times that of the tube.

The full calibre shell is retained in its proper trajectory by a tubular tail piece having affixed thereon spiral steel vanes, which serve to give rotation and keep the point foremost.



SUB-CALIBRE ÆRIAL TORPEDO.

The sub-calibre shell may have any diameter less than that of the bore; and is centred by an attached gas-check of full calibre and a centring piece attached to the body of the shell near the point. The 8″ shell carries 100 pounds of explosive and the 15″, 500 pounds.

The Merriam combination fuse has a delay action such that the torpedo can be exploded at the surface or at any desired number of seconds below water, or by direct contact.

The question of accuracy of fire appears to have been settled by the trial before the Naval Board in 1886, when four out of five shells landed in essentially the same spot at 1613 yards—the other went 7 yards beyond. The extreme range is 4500 yards.

Torpedo artillery as developed in the pneumatic projector compares most favorably with other methods of sending a torpedo to any given point of attack.

Compared with controlled torpedoes: It is not stopped by booms or netting. Its speed is fourteen times as great. It can discharge torpedoes at the rate of about one per minute. It has no long life artery of wires exposed to injury. Good practice can be made when the object attacked is enveloped in smoke, a mast being all sufficient to aim at. It can be used in thick weather, fog and darkness (some portion of the object being visible) much better than an arm which must be kept in sight and guided during the whole run. It can be used effectively at short ranges from a rapidly moving platform, such as a man-of-war or a torpedo boat.

In these particulars the controlled torpedo is distinctly inferior and its superiority on any other point has not been suggested. No system of the kind can compete with one that hurls large torpedoes with remarkable accuracy, and at least equal range, at the rate of nearly one per minute.

"There is but little difficulty in so locating and directing torpedo artillery that the shell shall not damage the mine defenses." (Bucknill.)

Controlled torpedoes cannot always be employed over waters mined with electro-contact and automatic arrangements which are near to the surface at low water in situations where the rise and fall of tide is great.

But submarine mines should never be replaced by torpedo artillery nor by controlled torpedoes, for however perfect these may be, they do not possess the blocking effect of hidden and unknown mines.

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"Remembering that a cleared and buoyed passage is a *sine qua non* for the attacking fleet, and that by daylight the guns of

the forts will sweep the mined zone with a murderous fire, the uncertainty of any unsystematic attack is apparent."

"The only successful method of attacking land mines has been shown, by the experience of centuries, to be by countermines, and I believe that future wars will teach the same lesson for sea mines." (Abbot.)

"The first step taken by the attack will be a heavy artillery fire, delivered against those portions of the defense within range and exposed to fire."

"This will be done by daylight. To attempt any boat attack on the mines, before the artillery defenses had been crippled as far as possible, would simply invite defeat."

"The patrol boats of the defense could not hope to offer an effective resistance in the advanced zone, except for a short time. They would retire as soon as the attacking flotilla had reached the waters within range of the quick-firing guns and await opportunities for making offensive returns."

"If old hulks, steered by electricity, be sent forward to explode the mines, or if rafts provided with grapnels (creeping operations) drift in with the tide, the mine operator would switch off his batteries, and, although injury might result, a terrible uncertainty would remain with the enemy as to how many perfect mines might still be waiting to receive him."

"Sweeping for mines" by boats in pairs, with ropes or nets between them, is a most difficult operation to carry out at night, and it would of course be impossible to perform it successfully by day under a hostile fire."

"Countermining operations, whether conducted by means of heavily armored vessels which plant the countermines and then back off and explode them by electricity, or by vessels armed with pneumatic tubes, will neither be expeditious nor safe, even when undertaken from a distance. They can hardly be successfully performed by daylight, so long as the artillery defenses remain, and considerable uncertainty would attend the operation when conducted under cover of darkness, however carefully the ship may be laid by compass bearings or by lights on shore should these exist."

"Sweeping" and "creeping" could never be undertaken by daylight, within range of the shore, so long as the defense retained the power of bringing machine-gun fire to bear upon the boats.

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"By night new mines would be dropped into any channel that might have been cleared and buoyed.

"In short, the whole of the work connected with the attack on mined waters is so difficult and hazardous, that we may fairly doubt the probability of these operations being seriously undertaken until the forts and batteries have been demolished and the defense thoroughly demoralized." *

* The writer desires to make acknowledgment to the various works of General H. L. Abbot, Corps of Engineers, U. S. Army; to Colonel J. T. Bucknill, R. E., (Submarine Mines and Torpedoes, John Wiley & Son, No. 15 Astor Place, New York) and to Mr. C. Sleeman (Torpedoes and Torpedo Warfare, Griffin & Co., The Hard, Portsmouth, England).

ERRATA.

First part, on page 184 :—The remark concerning the relative density of Dynamite and Blasting Gelatine presumes dynamite to be in loose powder.

On page 186, sixth line, for relative value, read "relative values."

In Colonel Bucknill's table, 0.9 for gunpowder evidently refers to gravimetric density.

On page 189, last line, for short station read "shore station."

On page 192, last line, for action currents, read "action of currents."

THE ORGANIZATION AND USE OF ARTILLERY DURING THE WAR OF THE REBELLION.*

By CAPTAIN H. W. HUBBELL, U. S. A.,

First Artillery.

IT was fortunate for the Federal Government that, at the outbreak of hostilities in 1861, its military establishment contained a large proportion of artillery regiments. The Regular Army possessed five regiments of cavalry, four of artillery, and ten of infantry, making twenty-one per cent. of the line of the Army artillery, against eleven per cent. at the present time. As regards the officers, the percentage was still greater. It is true that the artillery was employed as infantry to a greater extent before the War than at any time since, as a large number of companies were doing duty at frontier posts; still, the officers had the benefit of instruction by rotation in the two field batteries, or light companies, as they were called, in each regiment. The Artillery School for practice at Fort Monroe embraced a garrison of eight companies, which were changed from time to time, so that the officers and enlisted men, as a whole, might have been considered well qualified in the various duties of artillerymen, —field, siege and garrison. The 5th Regiment, organized in May, 1861, took its field officers, captains and senior lieutenants, together with a large number of its non-commissioned officers, from the old regiments, so that it soon became assimilated and imbued with the discipline and *esprit* of the rest of the corps. The field officers, and most of the captains of artillery, were very shortly drawn off to fill high volunteer commands and staff positions, but these, ere their departure, were able to induct into their duties the large influx of young civilians who were commissioned to fill the vacancies caused by resignation and dismissal, and who, from their youth, were generally apt pupils, and soon qualified themselves for their positions. These officers, with a fair proportion of fine material from the Military Academy and a sprinkling of officers promoted from the ranks,

* Read before the class of officers at the Artillery School, Fort Monroe, Va., in 1887.

fought our batteries from Bull Run to Appomattox, if not always with success, never, it is believed, with dishonor. At the close of the War they were rewarded by the brevets of lieut.-colonel, bestowed upon the captains, and major upon the first lieutenants. Their more far-seeing comrades, who left them early in the fray for positions in the staff corps, were honored by a discerning Government, in many instances, with the brevet of brigadier-general, and this, although their duties had been entirely confined to the bureau and desk.

The artillery, on January 1st, 1861, was widely scattered throughout the land. There was not even the semblance of an attempt at keeping the companies of a regiment in the same region of country. The stations of the First Artillery will serve as an example. Companies A and C were at Fort Monroe, Va.; B, Key West, Fla.; G, Fort Barrancas, Fla.; D, Baton Rouge Barracks; F, L, and Light Co. K, Fort Duncan, Tex., and Light Co. I, Fort Leavenworth, Kas. The enlisted men of the artillery, like their comrades in the other corps, remained true to their colors when the States seceded. This is the more creditable when we consider the fact that many of them were aliens by birth, that they were tempted by the prospect of promotion held out to them by the Secession leaders, and by witnessing whole communities abandoning the flag under which they were born. These faithful men were invaluable in quickly moulding, by their example, the great number of recruits assigned to the batteries when they were mounted and increased from about fifty to one hundred and fifty enlisted men each. Such, then, was the personnel of the Regular Artillery during the War. It should be added, however, that depleted batteries in the field were, by authority of the War Department, filled by drafts from volunteer infantry regiments, owing to the difficulty of recruiting the Regular Army, due to the high bounties paid the volunteers. These men soon became assimilated to the discipline of the Regulars, and were not to be distinguished from them. As regards the officers and men of the volunteer artillery, they were about of the same type as existed in the other volunteer corps, no special mental or physical qualifications being observable. Our immunity from attack by sea, owing to the lack of a navy by the Confederacy, precluded any opportunities for the service of our artillery in our sea-coast forts, with one notable exception, viz.: the defense of Fort Sumter. As this was but a perfunctory resistance; a garri-

son of seventy-five men of the First Artillery pitted against thousands of the enemy, manning batteries erected on every available spot, it was of value only as illustrating one point, namely, that our sea-coast forts of that period, of which Fort Sumter was one of the most recent types, were invulnerable to the heaviest ordnance then in use.

Gen. Truman Seymour, who was captain of one of the batteries in Sumter, says: "Two thousand three hundred and sixty-one shot, and nine hundred and eighty shells had been delivered at Fort Sumter. No material injury had been done to the work, and its defensive capabilities were rather increased than diminished when the barracks had been consumed. It might have withstood, indefinitely, any amount of battering from smooth-bore guns, which only scaled off here and there a few inches in depth of the brick wall. The essential and vital weakness of Sumter was in the lack of provisions. When the work was evacuated there remained unconsumed only some six barrels of pork, and the holding of Sumter was strictly limited to the endurance of this pork which would have lasted as many days,—there was no apparent possibility of being supplied from without. The dispersed condition of the companies brought the Government in 1861 face to face with the necessity for providing itself with more field artillery, and was the immediate cause of the 5th Regiment being organized; for although when the Civil War broke out, the companies were called in as quickly as possible, in many cases it could not be done soon, and in some instances it was not known that it could be done at all. The law designated as '*batteries*' the tactical units of the regiment. This was the first time this designation had received legal sanction, although for several years the terms 'light company' and battery had been treated as synonymous in orders from Army Headquarters. The 5th was equipped throughout as field artillery. The importance of placing on a field artillery footing every company of the old regiments that could by any manner be made available, was quickly appreciated; and for the reason stated above, that the enemy was not a maritime power, it became the easier and more reasonable thing to take for this work the companies from the sea-coast, as well as those from the interior." On August 23d, 1861, General Barry, Chief of Artillery, Army of the Potomac, addressed General McClellan, as follows:

"To ensure success, it is of vital importance that the Army

should have an overwhelming force of field artillery. To render this the more effective, the field batteries should as far as possible, consist of regular troops."

"Upon reaching Washington on July 27th, 1861, General McClellan found in the forces assembled in and around Washington, 650 artillerymen with 9 imperfect field batteries of 30 pieces and 400 horses. On November 30th, this force had been augmented to 130 heavy and 248 field pieces, and on March 31, 1862, when the whole Army took the field, it consisted of 92 batteries of 520 guns, 12,500 men, and 11,000 horses, fully equipped and in readiness for active service. Of the whole force 30 batteries were Regulars, and 62 Volunteers. General McClellan recommended that the whole of the regular artillery, old and new, be ordered to report at Washington except the mounted batteries actually serving in other departments, and the minimum number of companies actually necessary to form the nucleus of the garrison of the most important permanent works. These earnest recommendations had the effect to bring into the Army of the Potomac as field batteries half of the regular artillery of the United States. As usual with that arm, the service was by detachment, the regular batteries forming nuclei around which gathered the volunteers. This important principle of organization, conformable to the sound and settled policy on which the Regular Army has been maintained in time of Peace, was observed in every phase of organization that the artillery experienced, and whether assigned to brigades, divisions, corps or armies, and with or without reserves. Horse artillery was early recognized as the associate of properly organized cavalry. Accordingly some time in the fall of 1861, Tidball's Co. (A) of the 2d was equipped for that service at Washington, forming the first company of horse artillery in the Army since Bragg's company was dismounted at Santa Fé after the Mexican War. This was soon followed by three others, the four being formed into a horse artillery brigade, and so efficient did they prove that by the date of the battle of Chancellorsville, May, 1863, their number had been doubled. After this battle the horse batteries which now embraced a few volunteer organizations, were organized into two brigades, that they might alternate campaigning and recuperating in their arduous services with the cavalry. The strength of these brigades gradually increased in personnel and fighting power as their utility became manifest, and their management understood, until under Meade, May 4,

1864, on the eve of the Wilderness battles, the two brigades embraced 12 batteries. Seven were 6-gun, and five 4-gun batteries." These splendid organizations, each comprising about 1200 men and horses and 32 guns were commanded by captains. Associated with cavalry of other armies than that of the Potomac were horse batteries, the armament being generally three-inch rifle guns, which were served with an enterprise, *élan* and effectiveness unsurpassed up to that time by the first artillerists of the world. Of the companies equipped for longer or shorter periods, as field batteries from the Regular Army during the Civil War, about one-third served as horse artillery.

"At the beginning of the War artillery was distributed to regiments and brigades. To those who were capable of learning, a brief experience was sufficient to demonstrate the disadvantages of the system. It sacrificed in an army of any considerable size that concentration which alone renders artillery fire formidable; therefore the brigade system broke down.

"In the re-organization by General McClellan in July 1861, the following principles formed the basis for the organization of the artillery:

"1st. The proportion of artillery should be in the ratio of at least 2½ pieces to 1000 men, to be expanded if possible to 3 pieces.

"2d. The field guns should be restricted to the systems of the United States Ordnance Department and of Parrott, the smooth bores (with the exception of a few howitzers for special service) to be exclusively the 12-pounder guns, model of 1857, variously called the gun howitzer, light 12-pounder, or the Napoleon.

"3d. Each field battery to be composed, if practicable, of six, and none to have less than four guns, those of each battery to be of uniform calibre.

"4th. The field batteries to be assigned to divisions and not to brigades, in the proportion of four to each division, one of which should be a regular battery, the rest volunteers; the captain of the Regulars to command the artillery of the division. In the event of several divisions being united into an army corps, at least one-half the divisional artillery to be withdrawn from the divisions and formed into a corps reserve. [NOTE.—The contingency provided for having arisen, the corps reserves were formed as contemplated when the Army was on the Peninsula.]

"5th. The reserve artillery of the whole Army to consist of

100 guns, comprising, besides a sufficient number of light mounted batteries, all the guns of position, and, until the cavalry be massed, all the horse artillery.

"6th. The amount of ammunition to accompany the field batteries to be not less than 400 rounds per gun.

"7th. A siege train of 50 pieces to be provided [subsequently expanded to 100 pieces at Yorktown, including 13-inch sea-coast mortars and 100 pounder and 200 pounder Parrotts].

"8th. Instruction in theory and practice of gunnery, as well as in the tactics of that arm, to be given the officers and non-commissioned officers of the volunteer batteries, by the study of suitable text-books and by actual recitations in each division, under the direction of the regular officer commanding the divisional artillery.

"9th. Personal inspections, as frequent as circumstances will permit, to be made by the Chief of Artillery of the Army, to see to a strict observance of the established organization and drill, of the special regulations and orders issued from time to time under authority of the commanding general, to note the improvement of officers and men of the volunteer batteries, and the actual fitness for field service of the whole, both Regulars and Volunteers.

"These principles were proposed by General Barry, the chief of that arm, and although in some respects they were departed from in actual practice, they formed the ground-work on which was built the artillery service of the Army of the Potomac."

McClellan says in his report:

"The creation of an adequate artillery establishment was a formidable undertaking, and had it not been that the country possessed in the Regular Service a body of accomplished and energetic artillery officers, the task would have been almost hopeless." He drew together all the regular artillery he could lay his hands on, and when the 3 corps = 8 divisions embarked for the Peninsular campaign, they were accompanied by 49 batteries, aggregating 299 guns, of which 100 were in the artillery reserve. Of the 49 batteries, 20 were Regulars; of the 18 batteries of the reserve, 14 were Regulars. It will not be uninteresting to note the changes which the organization of the artillery of the Army of the Potomac underwent at different periods. First of all an increase in the number of army corps caused a draught from the reserve artillery, which nearly annihilated it.

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"On the Peninsula there were three corps and two divisions, or ten divisions altogether." Four months later at Antietam, the Army embraced 6 corps and 1 cavalry division; total 19 divisions. "There accompanied the Army at Antietam 62 batteries; 7 only were in reserve." It will thus be seen that the creation of new divisions had in a few months well-nigh absorbed the whole of that superb artillery reserve, which took the field under McClellan at the beginning of 1862.

"At the close of the Peninsular campaign, General Barry, under whose immediate supervision the artillery of the Army of the Potomac had been organized, was appointed Inspector of Artillery, and Commander of Artillery in the defenses of Washington, being succeeded as Chief of Artillery by Colonel Henry J. Hunt, late Commander of the Artillery Reserve."

McClellan remarks in his report dated August 4, 1863, concerning this officer, that he "had commanded the artillery reserve with marked skill, and brought to his duties as chief of artillery the highest qualifications. The services of this distinguished officer in reorganizing and refitting the batteries prior to and after the battle of Antietam, and his gallant and skillful conduct on that field merit the highest encomiums in my power to bestow.

"General Hunt continued in this position during the rest of the War, stamping on the Service of which he was the head, the impress of a cultivated mind, stored with knowledge of the uses and capabilities of the artillery arm, the result of extensive experience, profound study, and reflection.

"At Fredericksburg General Burnside's army consisted of 6 corps each of 3 divisions, and 2 cavalry divisions. He had 67 batteries, 9 of which were in reserve. The 58 batteries attached to troops were with the divisions, a number varying from 1 to 4 being with each, depending on the arm of service and the strength of the division. In the cavalry each division had one horse-battery, drawing on the reserve for a greater number when needed. The effective strength of the division was about 5000 men. Two-thirds of the batteries were 6-gun, the rest had 4 guns each.

"At Chancellorsville General Hooker had 8 corps, including 1 of cavalry; a total of 23 divisions. Of the 71 batteries, 12 were in reserve, except 2 attached to the provost guard, the rest were assigned to the divisions.

"In the 11th and Cavalry Corps, half the artillery was formed into a corps reserve. The divisions averaged about 5000 men. The average number of guns, including the general reserve, was 3 per 1000 men. Down to this time the principles originally adopted as those upon which the artillery should be organized had been adhered to, and even the 12th Corps, which at Antietam had its guns massed as corps artillery, at Chancellorsville, under one commander, had its batteries distributed to divisions in accordance with the original plan. As, however, regiments had been compelled to surrender up their artillery to brigades, and these in their turn to divisions; so, as experience in manœuvring and fighting large armies was gained, did it become manifest that to most effectively organize the arm for administrative and fighting purposes, divisions must give up their artillery to army corps. "Accordingly, after Chancellorsville, the change was effected, the batteries of each corps being organized into what was designated an 'Artillery Brigade,' the commander of which had, or was supposed to have, his own staff, adjutant, quartermaster, commissary, medical officer, etc."

"As illustrating the disadvantages under which artillery officers often labor in the matter of rank, it may be noted that while these artillery brigades were considered equal in importance and fighting power to divisions of infantry, the latter were commanded by generals, the former, as a rule, were commanded by captains or lieutenants, except where here and there a volunteer field officer of artillery was found for the position. Apropos of this disadvantage, General Hunt in addressing the writer sets forth the following facts and opinions:

"Had General McClellan remained at the head of the Army, it (the artillery) would have got its proper place. He was the only general-in-chief at Washington, or of the Army of the Potomac, who comprehended the matter. His worst *drag* was found in the artillery itself; I mean in getting legal status for it. In the beginning General Barry told me, that when he went to the Adjutant-General and Secretary of War with McClellan's outline for organization of the artillery, in which he stated that for the present he wanted only two brigadier-generals, one as chief of artillery, the other as commander of the artillery reserve, the Adjutant-General said, that the law would not allow it, that it authorized one brigadier for each brigade of not less than four regiments to forty companies. That there were to be sixty

companies of artillery in the Army of the Potomac, more than enough for one, but not enough for *two*. To General Barry's statement that a battery was the equivalent of a *battalion*, and on that basis the artillery was entitled to five brigadiers, the Adjutant-General answered that a *company* was a company whether it was infantry, cavalry or artillery, and he prevailed with the Secretary of War. So General McClellan was forced to ask the appointment of an aide with rank of colonel (Hunt), and two with rank of lieutenant-colonel (Hays and Getty), and assign them in virtue of that rank to the artillery reserve. Probably this helped the Tom-fool idea then and still prevalent in our Army, that every artillery officer of higher position than battery commander was a '*staff-officer*.' When General Halleck took command of the Army in Washington, he decided that a battery was the equivalent of a regiment, it was commanded by a captain, so had no need for field officers. You will find in G. O. for 1862, I think, that artillery field officers were forbidden to be mustered into service; batteries to be received, not by regiment, but as independent batteries. The War Department decided 1st, that a battery was a company and therefore could not have generals, 2d, that a battery was a regiment, and could not have field officers, and stuck to both decisions throughout the War."

Birkhimer says in referring to this situation: "The erroneous ideas, to which attention has been drawn, led to others and to an invidious discrimination against the artillery in our own Army." Accepting as an established fact that the battery was the artillery unit, the conclusion was drawn, that there was nothing about the service of that arm higher than a battery which could be legitimately the subject of command. After quoting the general order referred to by General Hunt which prescribed that as a rule artillery will be called for and received by batteries, thus rendering the field and staff unnecessary, he says: "as a result when these batteries were assembled into brigades, the field and staff, here pronounced unnecessary, had to be drawn from captains and subalterns, thus increasing the duties of these officers and turning over the artillery brigades to those whose rank was in no wise commensurate with their commands." This arrangement was most unjust, and drove away many of the first officers of artillery, in point of merit, into the staff or other branches of Service, where they received the promotion they deserved.

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"The laws of the Confederacy, moulded with greater wisdom, and in accordance with the organization of modern armies, allowed a brigadier-general to every 80 guns, a colonel to every 40, a lieutenant-colonel to every 25, and a major to every 12.

"The number of batteries in a brigade varied according to the strength of the corps to which it was attached.

"Of the eight corps at Gettysburg, the first battle after this re-organization was effected, four had five, and two had four batteries to a brigade; the 6th Corps brigade had eight batteries; the Cavalry Corps had nine of horse artillery, the latter in two brigades of four and five batteries respectively. Four-fifths of all the batteries of the Army had six guns, the rest four guns. Each brigade included at least one Regular battery.

"The advantages to be derived from assigning the artillery to larger commands were that the batteries were better cared for and capable of more efficient employment on the field of battle. As a result fewer guns were required to perform the same amount of work. Consequently in 1864 the number of pieces was reduced to 2½ per 1000 men of other arms, having previously been in the ratio of 3 guns per 1000 men."

"When the Army of the Potomac took the field in 1864 the number of corps had been reduced from 8 to 4; the artillery from 67 to 50 batteries of field artillery with which were serving two regiments and three battalions of foot artillery, the latter armed as infantry for guards and escort duty. To each corps artillery brigade was attached a battalion of foot artillery for the various duties, artillery and other, required of foot troops. The two heavy artillery regiments formed part of the Artillery Reserve which, May 4, 1864, embraced 24 of the 50 field battery organizations of the army. Soon after the first movements of troops in the Wilderness campaign (1868), General Grant resolved to dispense with the Artillery Reserve owing to the swampy and wooded country, which did not permit of the use of artillery to advantage. After assigning 11 batteries to army corps, the remaining 13 were accordingly sent back to Washington."

In this connection it should be mentioned that two large depôts or rendezvous for artillery came into existence early in the War, which grew from small beginnings into large camps. One known as Camp Barry was located at Washington, and another for the Western armies at Nashville. At these depôts the newly formed volunteer organizations were received, supplied

with horses and guns and given preliminary instruction. Batteries from the field or elsewhere needing recruitment, remount and re-organization were here supplied, and at the close of the War most of the batteries were concentrated here to be mustered out or dismounted and to deposit their material.

Each 6-gun battery was reduced to 4, except the horse artillery. The surplus guns and horses, however, were only sent to Belle Plain on the Potomac, in readiness to fill gaps at the front." By this method of reduction the organizations were retained, together with the field officers belonging to the reserve; a matter of importance in an army where, as we have seen, that class of officers were prescribed; only the surplus *guns* were sent away. The retention of the caissons enabled the ammunition wagon trains to be correspondingly reduced. "Under this new arrangement, 31 field batteries were changed from 6 to 4 guns, and the brigades attached to corps were of 12 batteries each, 48 guns." The two brigades of horse artillery were consolidated into *one* of 8 batteries, 4 guns each, and attached to the Cavalry Corps. This reduced the number of guns in the horse artillery to 32, or to one-half the original number, thus making a total reduction in the field artillery of 94 guns. "In each horse battery, one section, two guns, was 12-pounder Napoleons, one 3-inch rifles. Most of the pieces ordered away when the reserve was broken up, were returned when the Army arrived before Petersburg to be used as guns of position in the siege operations. Besides these there was a siege train of 185 pieces, embracing siege howitzers, siege and sea-coast and Cœhorn mortars, 100-pounder, and 30-pounder Parrotts, 4½ inch rifles, and one 30-pounder Brooke rifle. The artillery operations before Petersburg from June, 1864, till May, 1865, were almost wholly in the nature of a siege, carried on under the supervision of the Chief of Artillery of the Army of the Potomac." "On taking the field for the final campaign in April, 1865, the size of the artillery brigades were reduced, and the surplus batteries either left temporarily in position in the lines or sent to the artillery reserve which had by sheer force of circumstances or in absence of specific instructions re-established itself with nineteen batteries, the supply (artillery) and ammunition trains of the Army. This reduction in the number of guns with the troops resulted from a desire to strip the Army of all impedimenta not necessary for the campaign then opening, of which the pur-

suit of the enemy was rightly expected to be one of the main features. The large brigades of twelve batteries organized when the reserve was broken up proved to be unwieldy, and there was a reaction. The brigades were reduced to a less number of batteries than they had before their increase, while the artillery reserve was re-established with a larger number than it had had before that time. Thus the organization of the artillery changed frequently during the four years of the War, as dictated by experience or necessity. Particular attention has been paid to the principles on which the Army of the Potomac was organized, and the changes made in that organization, for the reason that it was the most important army of the Nation. Its opponent was the Grand Army of the Confederacy, in which was concentrated the bone and sinew of the rebellious States, their warlike resources, organized and guided by the highest order of military talent at their command. In other armies than that of the Potomac, in their diverse fields of action, the artillery was variously organized, depending greatly upon the character of the country, the magnitude of the operations, including that of the forces engaged, and the views of the commanding generals; but as a rule, except in some of the Western armies, it will be found that as the War continued, as the resources of the combatants became compressed essentially into two or three well-organized masses, the tendency was to withdraw the artillery from control of subordinate commanders, and place that arm under the orders only of generals commanding the larger tactical units—divisions, and army corps. It may be well here to correct an erroneous impression concerning the artillery reserve, because of its name, which might lead to the idea that it played a secondary part in the field of battle. It was, to use a homely adjective, a *handy* body, quickly reached by the general in command, and its batteries were called for and run into every gap at the slightest provocation and early in the action. Its casualties will be found equal to those of the corps artillery. Its most important service was to beat the enemy by hard blows, and this it did early in its history at Malvern Hill, where every gun was employed, and with such effect that it confessedly saved the Army from serious disaster. The belief that a reserve was to be kept out of the battle, which, with many other erroneous ideas prevailed at the beginning of the War, was not figuratively speaking, but in fact, effectually exploded by its shells at Malvern

Hill, and its subsequent services in action sustained the reputation it there earned."

Regarding the organization and use of the foot artillery, the duties of this branch were almost entirely performed by volunteer regiments, designated heavy artillery, of which New York and Pennsylvania furnished the largest quota. At the termination of the War, the defenses at Washington consisted of 68 inclosed forts and batteries, having an aggregate perimeter of 13 miles, and emplacements for 1120 guns; besides 93 unarmed batteries for field guns having 401 emplacements; 20 miles of rifle trenches, and 3 block houses. The garrison of these works consisted at one time of about 18,000 disciplined and instructed foot artillery. Most of these regiments were sent to re-inforce Grant's army in the Wilderness, where they rendered gallant service as infantry. In most of the sieges in the South and West, the guns were served by infantry, instructed in their new duties as time and opportunity would allow. The siege of Fort Pulaski, Ga., in the spring of 1862 was notable as demonstrating for the first time the power and effectiveness of rifled cannon for breaching at long distances; at distances, indeed, hitherto untried and considered altogether impracticable. "A brick wall seven and a half feet thick, standing obliquely to the line of fire and backed by heavy casemate piers and arches was breached at 1700 yards by old 32 and 42-pounder rifles firing 64 and 84 pound James projectiles." In the previous history of sieges 1000 yards had been regarded as the extreme limit for successful battering, and then from four to seven days were required, against less than twenty-four hours, which served to make a practical breach in Fort Pulaski. The siege of Charleston was the occasion of bringing into use the heaviest rifled gun known at that period; the 300-pounder Parrott, familiarly known as "the swamp angel."

"The investing artillery at Vicksburg, consisted almost entirely of the field batteries of the besieging army. Of heavy guns proper, there were but 6 32-pounders, and the Navy supplied a battery of heavy guns. As the beseigers had no mortars, wooden ones were made by boring out logs of the toughest wood obtainable; these, with a bore large enough for 6 and 12-pounder shell, were hooped with iron and used as Cœhorns."

To attempt to relate in detail the use of the artillery during the Civil War, would be to write a history of every battle. It

might well adopt the motto of the Royal Artillery, "*Ubique.*" Its officers were often called upon, in addition to their legitimate duties, to perform those of engineers, in the construction of field-works and batteries. They were largely so employed before Yorktown in 1862. The cannoneers of the horse batteries frequently acted as escorts to their trains, and on more than one occasion charged the enemy as cavalry. Staff officers who had seen service in the artillery were at times called upon for service with the guns; as for instance, Captain Pelouze, Adjutant-General's department, and Captain Turner, commissary of subsistence, members of General Hunter's staff, who, having volunteered for the occasion, were assigned to the command of batteries at the bombardment of Pulaski, where their knowledge and experience as artillerists proved of great value.

"Malvern Hill, July 1, 1862, was the artillery battle, *par excellence*, where the grand battery, including every gun from the general reserve, frustrated all attempts to pierce the Union line. It has been written by one of the leading generals of the Confederacy (D. H. Hill) that: "The result was exclusively due to the Federal artillery fire, which seemed as destructive as could have been that of 20,000 muskets, and I doubt if that number of muskets could have held the position and driven our forces back." General Hill also remarks: "He (McClellan) had an immense preponderance in artillery, and that of the most superb character. Artillery seems to have been a favorite arm of General McClellan and he had brought it to the highest point of efficiency." Again, a Confederate general says: "The battle with all its melancholy results proved, however, that the Confederate infantry and Federal artillery, side by side on the same field, need fear no foe on earth." In his report of the seven days' battle, General McClellan remarked: "It is not my purpose to make mention of distinguished services. I will simply call attention to the invaluable service rendered by the artillery, and say that its performances have fully justified my anticipations, and prove it to be our policy to cherish and increase that arm."

At Antietam, preliminary to the general engagement, a lively artillery duel took place between the opposing batteries on the opposite sides of the stream.

The practice of our batteries was so excellent, and their superiority over those of the Confederates so apparent that a Confederate general in his report says: "An artillery duel be-

tween the Washington (New Orleans) artillery and the Yankee batteries across the Antietam on the 6th was the most melancholy farce in the War. They could not cope with the Yankee guns." At Sharpsburg, during the battle of Antietam, four horse batteries held the centre of our line nearly the whole day, without any other support than a regiment of cavalry, under the cover of the hill in their rear.

At Chancellorsville, after the surprise and rout of the 11th Corps by Stonewall Jackson, and when the Confederates were pushing victoriously onward, Berry's division formed a line to check the advance. Pleasanton of the cavalry, ordered a cavalry charge of 400 men in column up a road into 10,000 of the enemy; desperate expedient merely to gain time, and in which the gallant leader of the charge, Major Keenan, 8th N. Y. Cavalry, lost his life. He then brought up his horse battery and such guns as he could collect, twenty-two in all, and with Sickles, assailed the enemy's right flank. The artillery of the 12th Corps, under Colonel Best, making fifty pieces in all, checked the advance in front. Swift destruction was poured into the Confederate ranks, the torrent was stemmed, and Jackson had received his death-wound.

The third day at Gettysburg was opened by the Confederates with a fire from 145 guns. "Ample means for reply were at hand under the able direction of General Hunt, and for two hours the artillery combat raged as a prelude to the less noisy but more deadly shock of infantry." Both sides suffered severely. No less than eleven caissons were blown up. "At 3 P. M. General Hunt ordered our artillery fire to cease, in order to cool the guns, and to preserve some rounds for the contest at close quarters. "Pickett's division in its charge that day received a severe fire from our artillery which did not delay, however, for a moment its deadly advance."

While personal anecdotes are not strictly appropriate in a professional paper of this description, still, as illustrating the resolute spirit with which our artillery was served, it may be permissible to introduce the following episodes of this battle:

Bigelow, commanding a Massachusetts battery, was ordered to sacrifice his command to give the others time to form a new line. He fought with fixed prolonge until the enemy were within six feet of him, and then retired with the loss of three officers and twenty-eight men. Phillips' battery which adjoined his had a similar experience.

Webb's brigade of the 2d corps had received the concentrated artillery fire preceding Pickett's charge. Cushing's battery "B," 4th U. S. on Webb's left, and Brown's Rhode Island, on his right were both practically destroyed by the cannonade. The horses were prostrated, every officer but one was struck, and Cushing had but one serviceable gun left. As Pickett's advance came very close to the first line, young Cushing, mortally wounded, holding on to his intestines with one hand, helped run his only gun down to the fence with the other, and said: "Webb, I will give them one more shot." At the moment of the last discharge, he called out "good-bye," and fell dead at the post of duty. "In the battles of the Wilderness artillery was wholly ruled out of use, owing to the dense woods and thickets; the massive concentration of three hundred guns stood silent, and only an occasional piece or section could be brought into play in the road sides."

From Fort Sumter to Appomattox the artillery had done splendid service, and won renown second to no other arm, and had it possessed a disinterested champion or chief at the seat of government when the peace establishment was fixed in 1866, it might have been given that permanent organization which the experience of four years' warfare pointed out as essential, and which all civilized nations, except our own, have long since adopted. The all important subject of a chief was strangled in the house of its friends, as the senior officers of the arm were entirely without harmony as to who should be the incumbent of the office. Nothing was accomplished save the placing of the four old regiments on the same footing as the 5th, which consisted merely in giving them a third major, and designating their companies, "batteries."

"A permanent artillery advisory board, organized in January, 1866, languished till the autumn of that year, when it adjourned never to reassemble."

General Hunt, to whom the writer had applied for information, closes his letter with the following remarks, which will also serve as a conclusion to this paper:

"I hardly know how to advise you as to your subject. "In a rash moment I promised two months ago to write a paper similar to yours for the Massachusetts Historical Society, 'The Artillery in the War,' to be read next January, and I am puzzled how to proceed. "The subject does not admit of the same

treatment as does that of the cavalry, etc., and I tried to get off by saying that it could not be done satisfactorily without going back, perhaps to the Revolution, and it would be all the way through, the screed of a 'sore head'; but they replied 'that was just what they wanted,' so I am committed." Referring to Lieutenant Birkhimer's work, he says: "You will find much that is suggestive in it, especially the disadvantages of the artillery having *no head-chief—a centre of administration;* hence, no rules or regulations for its service when connected with other troops; no recognized principles whatever for its employment; an utter ignorance on the part of most or many commanders of army corps and divisions of its uses and capacities; the marked contrast in the regard paid to it by Washington and Revolutionary generals, and those of our Civil War. The artillery wants an administration of *its own.* It will never be efficient without one." General Hunt excepts from these reproaches General McClellan, of whom he had a high opinion, as expressed in another part of this paper, and closes by saying: "I can hardly go further into the subject, but will be glad to answer any special questions, when you need information that I can give, for I am not losing my interest in the arm, *although it has cost me my whole professional career.*"

LIST OF WORKS DRAWN UPON AND CONSULTED.

Defenses of Washington.....Barnard
Peninsula Campaign—Artillery Operations.....Barry
The Peninsula (Campaigns of the Civil War).....Webb
Chancellorsville and Gettysburg (Campaigns of the Civil War).....Doubleday
The Campaign of Chancellorsville.....Dodge
Siege and Reduction of Fort Pulaski.....Gillmore
Campaigns of the Army of the Potomac.....Swinton
JOURNAL of Military Service Institution.
The *Century* Magazine—War Articles.
Historical Sketch of the Artillery, U. S. Army.....Birkhimer
The First Regiment of Artillery.....Haskin

A REGIMENTAL COURT OF HONOR.*

By LIEUT. J. H. WILLS, U. S. A.,

Twenty-Second Infantry.

SINCE the War, and especially during the past few years, there has been great activity throughout the Army on all subjects relating to the profession of arms. More attention than ever before has been paid to the technical education of the officer. Schools of application for all branches of the Service have been established and officers of the line are now allowed to take advantage of special courses of instruction, a privilege hitherto only enjoyed by the staff. The Military Service Institution has been inaugurated and the numerous articles on military subjects found in the pages of its JOURNAL, evince the awakened interest that the Art of War is exciting throughout the Service. The spirit of improvement is to be seen in everything affecting the mental requirements of the officer and even in the matériel of his profession. The welfare of the enlisted man has been made the subject of special attention and the improvement in the condition of the soldier, if not always in the soldier himself, is very apparent. This spirit of progress is highly commendable, but another very important factor in an officer's, and therefore in the Army's efficiency, is being allowed to suffer from neglect, indeed I might say, to go by default; and that, too, in a matter in which the education of the officer is of equal importance with his mental training. I refer to the honor of the brotherhood of officers.

That more attention is needed the authorities high and low in maintaining a proper sense of honor in the Army will strike any one very forcibly on a perusal of General Court-martial orders published by the War Department. Often, where the sentence of the court has been dismissal for conduct unbecoming an officer and a gentleman, has the reviewing authority astonished the Service by reversal or mitigation. Cadets just learning to be officers have been found guilty of lying and their

* Read before the officers at Fort Keogh, Montana.

sentences of dismissal set aside, and there have been cases where by act of Congress culprits put out of the Army for crimes, the conviction of which rendered it scandalous for officers to associate with them, have been restored to their grade and rank. Thus does mercy outweigh discipline and military honor when the scales are held by the authority placed *over* the Army, but not in it. Nor are courts-martial free from the influence of mercy. Often when finding the accused guilty, and sentencing him to be cashiered, the members acting individually nullify their action by recommendations to clemency. There is too little punctilio in our Army. There is too little observance of the rules of courtesy and official etiquette and too much disposition to find fault, to grumble and to give utterance to our thoughts of our superiors in rank, our commanding officers, our comrades. With so little attention paid to this most important part of our officers' training, with so few well-defined usages and customs of the Service regulating the action of officers in cases affecting their honor, or that of their comrades, the only wonder is that the standard of honor in the Army is so high.

In an edict of May 2, 1874, published by the Emperor William to his army on the subject of courts of honor, will be found the following noble words:

"I expect from the entire body of officers in my army that honor shall be in the future as it has been in the past, their highest treasure. To maintain it pure and spotless must remain the holiest duty of each officer as well as of the entire body. The fulfillment of this obligation carries with it the conscientious and thorough discharge of all other duties. True honor cannot exist without loyalty to death, without steadfast courage, firm decision, self-denying obedience, perfect truthfulness, strict secrecy, as well as self-sacrificing performance of even apparently the most trifling duties. It demands further that the dignity which arises from the consciousness of membership in that body to which is intrusted the defense of throne and country, shall find expression in the officer's every-day life."

If officers in their daily lives would carry out the precepts given in the words so fitly spoken, there would be no need for a court of honor or a court of any kind, but as they (speaking generally) do not and will not, the necessity exists for some measure by which the standard of honor in the Army may be raised and maintained.

In the old Army (of which naturally enough we hear a great deal), if traditions are to be relied upon, a nicer sense and finer feeling of honor existed. The code was to some extent in vogue in those days, and the knowledge that one might have to face the muzzle of a pistol at ten paces and with an active, intelligent agent in control of the trigger had doubtless a wholesome effect. What we might term drum-head courts of honor held sessions in those days, and often when an officer by disgraceful actions showed that his sense of honor was asleep or dead, he would be suddenly summoned before an assembly of three or four of his brother officers and advised that the best interests of the Service, and incidentally his own good, required that his resignation should be forthcoming, and I may add that it generally forthcame. Now the duel is a back number in this country. It has been laid aside for the slower, surer and juster decision of a court. The Court-martial and the Court of Inquiry are the only legal engines for dispensing justice in our Service. That the aid of the latter is so seldom invoked is pretty positive proof of its inadequacy. The former is of course indispensable, but there are cases, in which the honor of an officer might be affected, not coming within the jurisdiction of a court-martial.

The German and Austrian armies have what are called courts of honor or honor courts, to give an exact translation.

The object of the Honor Court is to preserve the honor of the corps of officers as well as that of each individual.

It is their province, 1. To proceed against those officers whose conduct does not accord with a proper sense of honor or with the status of an officer where it is necessary by the removal of an unworthy member to preserve the purity of the honor of the corps.

2. To clear officers from groundless imputations on their honor, where other methods suitable to their station are denied them.

Courts of honor have jurisdiction, 1. In cases of acts of omission or commission on the part of an officer, which are repugnant to a proper feeling of honor, or to the status of an officer, and which therefore imperil or injure the common honor of the brotherhood.

2. In those cases where officers for their own protection demand the verdict of a court of honor.

In the German service every officer is subject to trial by a court of honor. I will only consider that over company officers,

the Regimental Court of Honor. This consists of all the officers of the regiment, battalion or independent detachment, the commandant being the president. The organ of this court is called the Council of Honor, consisting of three members, a captain, a first and a second lieutenant. These and their substitutes are elected annually. All the officers of the regiment voting for the second lieutenant, all save the second lieutenants for the first lieutenant, and all the captains, field officers, and the staff for the captain. Any officer has the right to bring to the notice of the council of honor or of the immediate commandant of the accused any acts which may jeopardize the honor of the brotherhood of officers. It is the duty of the council of honor in such cases to make a report to their commandant. The commandant then decides if, and what further steps are necessary, and if he deems the case of sufficient importance, he directs the council of honor to pursue their investigations and make report to him, either verbally or in writing. When he considers the case of sufficient importance to merit the action of a court of honor, he reports the facts to the commanding officer, who has power to convene a court of honor, submitting at the same time the proceedings and decision of the council of honor. When proceedings of a court of honor are begun, they are not interrupted until finished, and their competency is not affected by the removal or resignation of the accused. The council of honor, under the direction of the commandant, conducts the proceedings of the courts of honor, and these are in writing and must be confined to the demonstration of important facts, carefully avoiding all additional and unnecessary proceedings. The hearing of witnesses is before the council of honor, all members of which must be present. The testimony of all witnesses is sworn except that of officers, who certify as to the correctness of their testimony. The accused is allowed a hearing, and is acquainted with the charges before the convening of the court of honor. He is allowed access to the proceedings in the presence of a member of the council of honor. When the court of honor has completed its investigations, the accused is permitted to make his defense. He may hand in a written statement composed by himself or his counsel. Afterward, when the court of honor is assembled to render a verdict, the accused is allowed to defend himself either verbally or otherwise, or he may have another officer, his junior in rank, conduct his defense. For this purpose he is usually allowed eight days,

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which period may be further lengthened by the commandant. When the council of honor has completed its investigations, a session of the court of honor for verdict is called. Before this, attendance at the sessions of the court do not appear to be compulsory, but all the officers that are members must be present at this sitting. Unless the commandant and at least eight other officers with the right to vote are present, the court of honor cannot give a verdict.

When a court of honor is assembled for verdict its members are not sworn, but are warned by the commandant to give their votes as men of honor according to duty and conscience, and with due regard to the facts bearing on the case. Then the complete proceedings are read by the council of honor. The defense follows, and until this is closed the accused is allowed to remain. Then after due deliberation under direction of the commandant, which is preceded by the reading of an opinion in writing from the council of honor, every member gives the council of honor his vote verbally. The voting commences with the council of honor and then the other members of the court, and is in the inverse order of rank. Each member must sign his name to his vote. The accused has the right to challenge any member before the session for verdict. The decision of the commanding officer in this case is final. The following are excluded from participation in the final session: accusers, witnesses, defenders, near relatives, brothers-in-law and officers in arrest. The following are considered near relatives: fathers, brothers, sons, own nephews, own uncles and own cousins.

The findings of a court of honor may be acquittal; guilty of jeopardizing the honor of the corps, with a demand for a reprimand; guilty of injury to the honor of the corps, with demand that the accused be discharged with simple liberation of service, *i. e.*, loss of position in the Service; guilty of injury to the honor of the corps with aggravating circumstances, with demand that the accused be cashiered. When an officer is cashiered in the German army he loses his position and title as an officer. The court reaches a verdict when a majority of three present agree. When there is no majority for any one sentence, the vote for the harshest is coupled to that for the next mildest and so on until an absolute majority is reached. The members are enjoined to preserve secrecy until the publication to the accused of the sentence.

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The entire proceedings after going through the proper channels are submitted to the Emperor for his action.

The court of honor in the Austrian service does not differ materially from that in the German, except in its composition. For the trial of cadets and company officers a permanent court of honor is located at the headquarters of each division. This court of honor consists of nine members, one colonel as president, two field officers below the rank of colonel, four captains and two subalterns. When an officer is tried before such court he may appeal his case, if found guilty, unless the vote was unanimous. The effect of the decision of the commission of appeal, if it reverses the finding of the court of honor, is the same as if the accused had been acquitted in the first place. The decision of the commission of appeal and the proceedings of the court of honor in any case are forwarded to the commanding general of the division for his action.

It is not my purpose to outline any plan for courts of honor in our Service. That we need something of the kind will, I think, be admitted. That our Service would be benefitted by a higher standard of honor any one can see, and that a court of honor would bring about this most desirable result, a few minutes' thought will, I think, make plain to all. In the first place, an officer would always have a court where his sense of honor might be saved from outrage. If he considered himself insulted by a comrade, his motives questioned, or his honor impugned, by an appeal to the court of honor of his own regiment he could have his character cleared from suspicion and his honor established in the eyes of his comrades. A regiment would be the custodian of its own honor, it would possess the power of getting rid of unworthy members and of compelling conformity to the regimental standard of honor. If officers were liable to be summoned before some such tribunal to substantiate their careless speeches, a greater degree of vigilance would be exercised in controlling the unruly member.

There is too much looseness of speech among us. We are too much given to saying what we think, to criticising with undue freedom our superiors and inferiors, officially and socially. In a large measure a court of honor would do away with the pub licity that is given to the proceedings of courts-martial. Each regiment would eject its own black sheep without sounding a trumpet note to attract public attention. When charges are pre-

ferred against an officer, the fame thereof spreads abroad and the crime in all its details, disgusting or otherwise, is told in Gath and published in the streets of Askalon. The people form their ideas of the Army from these rare and isolated cases, and this state of affairs would in a great measure be prevented. Not the least among the benefits certain to follow the adoption of regimental courts of honor would be the renewed life given to *esprit de corps*. Each regiment would have the power to preserve its reputation, each officer would feel that he was the bearer of his regiment's honor as well as of his own. An offender would have a hearing before his comrades in arms, before those men with whom a large part of his life must be spent, and upon their decision would hang his future life as an officer. The necessity of making apparent to the officers of his own regiment that he was a man of stainless honor, of unwavering courage and tried integrity, would be paramount and a high sense of honor would begin where charity does, at home. With our garrisons increasing in size each year, the difficulties to be overcome in instituting courts of honor will soon vanish.

It is said to be a fact that armies, like nations, are apt to become demoralized during the piping times of Peace. Cannot our Army by taking a leaf from the book of the past learn how to avoid in whole or in part the consequences of inactivity and preserve in Peace as it has done in War, its discipline, its efficiency and its honor?

PRACTICAL WORK FOR INFANTRY.*

By LIEUT. E. S. AVIS, U. S. A.,

Fifth Infantry.

THAT infantry is best prepared for war which is best able to undergo the fatigues and privations of war and to comply with the requirements of modern tactics. The modern soldier must be capable of great physical endurance; he must understand his weapons and be able to use them to the greatest advantage, and to exercise his own judgment at times. The non-commissioned officers occupy a much more important place in modern war than was formerly the case, and therefore should receive a careful training in their duties. The intermingling of troops in battle requires skillful leaders in close contact with the men, that their efforts may be effectively directed.

The ancients were well aware that no man could attain excellence without labor, especially in war, and so required their soldiers to practice, in peace, severer exercises than would be required in war. The application of this principle to the practical work of war is now receiving great attention at the hands of modern nations, which are now trying to develop, in their soldiers, those physical, mental and moral qualities which are most needed in war.

MARCHING.

Infantry must make long marches before arriving near the battle-field and then be in condition to reach the right place at the opportune moment and in form to move rapidly over distances as great as 2000 yards, under fire, much of it at a run, and to drive the enemy from a covered position. Such conditions call for good staying qualities and require infantry to be trained to hard work, long marches, and to run long distances. An important step has been taken in the right direction by those department commanders who place their troops in summer

* This essay received in 1889 a special prize from the M. S. I. for the best short paper on an infantry subject.

camps. Marches should be frequently made in the vicinity of the post; companies could be sent out, for a day or two, to bivouac and to perform some special patrol duty. Care of person, feet and clothing could be spoken of during such marches. Forced marches should be made occasionally so that the troops could know how much they can accomplish.

WALKING AND RUNNING.

There should be a walking and running track at every post, 100 or more yards long. Men should begin by walking at an ordinary rate for 100 yards and gradually increase the pace and distance until they can accomplish long stretches. Burdens should be gradually added until the men can walk faster and carry heavier loads than will be required in war. The same method should be pursued in running until the men can run 2000 yards with a heavy burden and finish in good wind. The men should be shown the step best suited for walking and that best adapted for running. Two gaits, of course, are necessary; one for long distances or steady gait, and a rapid gait for a quick mile or two. After the work on the track the men should be practised in cross-country walking and running. Provision should be made to place temporary obstacles on the track if permanent ones cannot be made on a separate track, so that the men may be accustomed to leap ditches, climb walls, pass hedges, fences, etc. It may often be expedient, in battle, to send ammunition forward by men, who should be trained to carry burdens and to advance rapidly. The men should be taught to run in column and in line.

GYMNASIUM.

A gymnasium well equipped with simple machines, should be at each post. Ladders, ropes, bars, horses, poles, and escalading apparatus could be provided at small expense, and a room economically built, in connection with a drill shed. During the winter all available men should be trained in the simple exercises, and gradually advanced to more difficult and practical feats. Men should be able to jump up, down, and forward, with and without poles, standing and running, as well as backwards and to the side, with arms and burdens. They should walk a beam, plank, and log, cross a pole, rope, etc., with and without burdens. It may be necessary to carry a wounded comrade over such obstacles, or to take a large rope over a stream. There

should be a large tank in the bath-house, for swimming, and the men should be practised in the neighboring streams, with and without burdens.

SETTING UP.

As recruits are required to use muscles which have generally been little developed and appear awkward, it would seem wise to begin their military instruction with such simple gymnastic exercises as would bring the proper muscles into play. Turning the head, bending the neck, extending and bending the arms, wrists, fingers, legs, knees, feet, etc., are readily taught, and recommend themselves as preliminary to drill. This method is so natural that it is almost a matter of surprise that the Americans, who are so quick to discover and apply the best practical methods, have not already introduced this system into their military training. In our great haste to prepare men to "march in review," have we not neglected practical methods? In place of our limited "setting up" we should have practical gymnastic exercises; instead of "balance step" the men should be taught a good walking step. On the march men take a natural gait; why waste their time on the constrained and unnatural "balance-step"? Good walkers are better than precise steppers.

If one hour every morning be spent in running, walking, and gymnastic exercises we will soon have hardy soldiers. Instructors will have ample time to point out faults and to teach the men to economize their strength.

BAYONET EXERCISE.

The bayonet exercise is good training and increases the confidence soldiers have in the rifle. They should be able to charge bayonets, thrust and lunge from any position, as well as from "guard." The absolutely necessary parries are few, but handiness repays for extra time. The parries should be called right, left, and head, and high and low, which would cover the ground with a simpler and more suggestive nomenclature. Cavalry should be received on the left side and the thrust made after the horse passes. The men should be taught to carry and hold the piece horizontal in passing obstacles. They should be shown how to sling the piece by passing the right arm through and resting the piece on the right shoulder while the right hand should steady it near the lock. Bags should be stuffed and suspended at proper

intervals, and the men should advance, thrust at them, and disengage without halting.

TARGET PRACTICE AND ESTIMATING DISTANCE.

The enemy must be destroyed, and target practice must be practical. At skirmish drill and in war, men are cautioned to fire low; why should not the bull's eye on all targets be at the bottom? Custom is a strong cable, and we should make it second nature for the soldier to fire low in battle.

Estimating distance should be practised always, for no man can become too expert. The soldier should be able to judge height, depth, distance and interval, by sight, sound, marching of troops, stepping off, etc. Those who show special aptitude should have special training. The necessity of correctly estimating distance on the battle-field cannot be overestimated.

A happy method of impressing the importance of this drill is to arrange targets to represent a battery, cavalry, or skirmishers, and bring the men unexpectedly against these targets and require them to estimate the distance and to deliver a volley, mark the result, and then fire again with proper elevation. The captain can readily arrange some exercise to suit the ground and the target; such as to take a battery, receive cavalry, attack a position, etc. Every opportunity should be improved. On the march the men should be required to pick out trees, houses, hills, approaching travellers and vehicles, and estimate distances. In taking a defensive position, ranges should be stepped off and marked to denote where attack should be received by volleys and by rapid firing.

FIGHTING.

We have passed the time to expect companies and regiments to be led, in a new war, by men trained in the actual experiences of war. It is wisdom, therefore, to cast about us for a means of properly training those upon whom such grave responsibilities will rest. We should have systematic, theoretical and practical training in the field exercises which reproduce the real incident of war.

Deployment should be taught to the squad, for, often small detachments will be sent forward and compelled to deploy, close and extend, as well as turn or wheel in different directions while deployed.

Infantry must be taught to advance over all kinds of ground

and to improve its advantages while steadily pressing to the objective. The storm of bullets which will sweep the coming battlefield will allow no standing man to resist it, and yet the enemy must be reached, for he will remain in his position as long as we stay at a distance, and we cannot have our attack demoralized by fearful losses. The intrenching tool must be used at times. The men must be taught to use cover to support the rifle when aiming, and to protect themselves when loading or watching the enemy, and to advance in the attack, or, to fall back when necessary. War is earnest and success in it requires preparation in peace.

Officers should be required to work tactical problems on maps, and on the ground, writing out all orders and the question or idea then submitted for general discussion. Instructions should be given the non-commissioned officers, and special privates upon the elements of topography, map-reading and sketching; conventional signs should be explained and the men taught to find their way by maps, cardinal points, sun, moon, etc., placed on the ground, and required to find the place on the map, and the reverse, etc. Much of the preliminary work of patrol duty, advance-guard and outposts could be lectured upon. A lecture should precede every exercise.

Near the post there will often be woods, houses, villages, bridges, streams, railways, camping ground, defensive positions, etc. The company, no matter how small, should be taken to such places and shown how to reconnoitre, attack and defend them under infantry and artillery fire, as well as to receive cavalry charges from various distances. The men should be taught how to prepare a house for defense, loophole a wall, barricade windows, doors and streets, to throw up rifle pits and to use cuttings, hedges, trees, etc., and how to attack the same with the least exposure. Simple bridges should be constructed, and the men taught to find fords suitable for cavalry, infantry, artillery and trains, and when and how long they would be good.

After the men are shown the attack and defense separately, the enemy will be represented. Heights, woods, fields, etc., will be occupied by the enemy, who will have detailed instructions, at first, concerning the part he is to play. The men will advance against the enemy, as in war, who will fire when the attack is exposed, and regulate the firing to the distance of the attack, the position will be occupied, the defenses pursued, or the attack abandoned as the circumstances dictate.

The instructor will see that the position is properly and advantageously occupied, and that the different phases of the attack and defense are properly managed. Practice will soon make the men expert and develop self-reliance and prompt decision, as well as the faculty of giving clear, precise and correct orders, in the officers and non-commissioned officers.

OUTPOSTS.

Ground should be selected and pickets, with their sentries properly posted and the duties explained, as well as the best positions pointed out, for day and night. Friendly and hostile parties and patrols should advance and retire, orders and information be transmitted and received, sentinels be relieved, attacked and made to fall back, the men performing their duties as in case of war. Patrols should be sent to explore the ground near and to surprise a hostile sentry, and should make a proper report.

ADVANCE GUARD.

Whenever the company marches, especially to the summer camp, it should have its advance guard; wherever the country permits, the front will explore as in time of war; when cultivated fields limit the action of the point the captain will point out the positions the different parts should occupy. It should march along the road when necessary, extend into the fields upon either side, examine woods and defiles, ascend heights, observe bridges and streams, question travellers and make reports from time to time, and submit a sketch of the route. The captain will explain the duties of the point should the enemy be discovered, and, for practice, may announce, "hostile patrol 1000 yards to right front," etc.

SUMMER CAMP.

Companies should be sent out from the camp for exercises, and, the captains, having agreed upon some idea, as attack and defense of a wood, defile, etc., should work out the problem for the instruction of their men. Companies may be sent out with special tasks so that they will unexpectedly meet each other, as enemy, and work out their problems. Reports should be made in all cases and the execution discussed. Outposts should be placed around the camp after a company has been despatched with secret orders to surprise the camp. The time should be

spent in practical exercises. While any supposition can be made upon the strength and position of the enemy the ground must be taken as it is. Two months' camp should give 30 company exercises and at least 10 company-against company exercises; 7 to 8 A. M., walking, running, gymnastic, bayonet, etc., exercises; 9 to 12 field exercises; 2 to 2.45 P. M., lecture on exercise for next day and questions on last; 3 to 4.30 P. M., battalion drill, and attack formations.

REPORTS.

In all of these duties there will be many written reports and orders, and much verbal transmission of information and orders, which must be properly and timely performed. The date and hour, place and method, should be specified, and knowledge and surmise separated. Orders must be precise, clear, and brief. The men should know the cardinal points and the report should locate the enemy, or place, as "near the north edge of such woods," "south of big brick house, etc., moving to the east," with three, or so many, men in his detachment, patrol, etc. The necessity of prompt and accurate reports about the enemy must be pointed out.

PRACTICABILITY.

Can such work be done by our infantry under existing circumstances? Much can be done: instead of one or two hours for drill let there be four or six, and it will not be long until great progress will be seen. After war begins these duties are learned only by paying a big price in life. Let them be learned now. Certainly the infantry can learn the simplest and yet most important duties of war. The cumbrous post guard, a relic of permanent fortifications, can, and should be replaced by outpost and picket duty. Warehouses could be locked and visited from time to time by a watchman from the guard house, whence prisoners rarely try to escape. Citizens use this common sense method. More men would be free for instruction. Soldiers quickly learn a thing when they see its advantages and uses. Working hours and details could be regulated to conflict very little with practical training.

INSPECTIONS.

Much interest is taken in practical work by inspectors and they would readily arrange their inspections to cover practical exercises. They would require:

Reconnaissance: The skilful and prudent conduct of detached men and patrols:

In examining ground, etc.

In searching for and watching the enemy.

In returning from the enemy.

In the correct and speedy transmission of information.

Outposts: The proper selection of a line of outposts and sentries.

The sentries properly instructed how to act and to transmit information in the several incidents already described.

Defense: The intelligent occupation of a position.

The best manner of reinforcing.

The most suitable accessory defenses.

The method to get an effective fire.

The kind of fire for different distances and how directed.

The manner of estimating distance of enemy.

The kind and time of reports sent back.

The counter attack.

The abandonment of the position.

Attack: The formation for attack, skirmishers, supports and reserves at different stages.

The different kinds of fire and how directed.

Action when attack is repulsed.

Action during voluntary and forced retreat.

Attack of woods, town, height, bridge, defile, etc.

Retreat from localities.

Retreat through defile.

Front attack.

Flank attack.

Enveloping attack.

Advance by rushes.

Assault and occupation of position.

Pursuit of enemy.

Thus covering much useful work.

If the inspectors be authorized to demand such work by infantry it will be as cheerfully and thoroughly done as any now required.

THE MILITARY SITUATION IN FRANCE.*

By LIEUT. JOHN A. LOCKWOOD, U. S. A.,

Seventeenth Infantry.

IN the history of the world there are several examples of sudden and sharp contests between nations, resulting in the overthrow, at least temporarily, of some great military power. But of all the struggles of this nature, the most recent, the one which about twenty years ago, after a period of only seven weeks, resulted in the capitulation of Louis Napoleon at Sedan, is unique in that its short duration, its succession of French defeats and the final complete success of the Prussians, surprised not only the vanquished French, and the more or less interested nations of Europe who were merely spectators of the struggle, but the victors themselves as well.

In 1870, France, intensely jealous of the growing importance of Prussia, saw fit to object to the seating of a prince of the House of Hohenzollern on the Spanish throne—at that time unoccupied. Although the prince in question voluntarily withdrew as a candidate, this did not satisfy France, or rather the cabinet of Napoleon III.; whereupon a demand was made by the French Government that the King of Prussia should never lend his assistance to any German prince to ascend the Spanish throne. The refusal of the king to comply with this demand led to the almost immediate declaration of war on the part of France. It was Napoleon's idea to attack Germany by dividing his army into three parts, and accordingly preparations for a grand invasion were made, and he was only prevented from carrying out this plan of campaign by the more rapid movements of the Germans, who did not wait to be attacked, but, in a marvellously short space of time, by means of their perfectly organized staff department, pushed their forces across the Rhine into France, and met the French in a series of hotly contested engagements in

* This article is to some extent a review of the work of M. Earnest Jaeglé, Professeur à l'ecole Militaire de St. Cyr. La Prochaine Guerre, France.

eastern France—the short campaign ending in the surrender at Sedan of Napoleon and his demoralized army. So confident had the French been of beating the Prussians on German ground that it is said they even entered on this disastrous campaign without providing themselves with maps of eastern France, and this omission led to great consternation when it was found that there, and not in Germany, would be the seat of war.

The surrender at Sedan virtually decided the contest, although owing to the obstinacy of the men at the head of the French Republic (which was declared as soon as Napoleon's surrender was known) in refusing to comply with the demands of Germany, hostilities were prolonged until the siege and first surrender of the city of Paris resulted in the German terms being acceded to. These terms included, besides the payment of an immense war indemnity, the cession of the province of Alsace and part of Lorraine to Germany. These provinces having once been a part of Germany, were now claimed by her as necessary to insure her against future attacks from France, and aside from their military importance, the possession of the Rhine provinces was to the French national vanity a substantial proof of their superiority over Germany. France in them possessed German territory, and had subjects of German origin who had grown to regard themselves as Frenchmen. Then, too, the vigorous and healthy peasants of these provinces, physically far superior to those of western France, furnished the nation with large, well-developed men for war as well as for the arts of peace. The loss of these provinces is a perpetual thorn in the side of France, and no patriotic Frenchman admits that they are lost forever. As a proof of this assertion, in the Place de la Concorde in Paris, is a magnificent colossal statue given by the citizens of Strasburg (the capital of Alsace) to the citizens of Paris prior to 1870. This statue is kept draped in perpetual mourning, and, it is claimed, will be so draped until the French tri-color once more waves over Alsace. On the base of the statue is inscribed the date when Strasburg became a city of France. Next follows the date when it was captured by the Germans, and lastly, a place is left blank for the date when it will be regained by France.

The cession of the Rhine provinces thus placed Metz and Strasburg, the keys of the French frontier of 1870, in German hands. It gave France a new frontier and a very open one—a frontier unprotected by any great natural obstacles, for the Ger-

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mans now held both sides of the Rhine and the northern passes of the Vosges Mountains, the same passes by which the French armies used to march to the Rhine under Napoleon I. All now are within German territory. Taught by the hard lessons of defeat the French Government set to work to put the new lines into a thorough state of defense.

Successive war ministers have steadily worked upon the plan originally laid down by the French engineers in 1871. Millions of francs have been spent; and now, after nearly nineteen years, the work is about finished. Probably so vast and complete a work of military engineering was never done before in so short a time. The French engineers were not content to erect upon the new frontier three or four first-class fortresses to serve as points of support for a defending army. They have closed it with a double line of works, linked them together with an elaborate system of railways, and, besides re-fortifying Paris, they have also fortified Lille and Lyons. Since the war Paris itself has been surrounded with a new circle of forts, placed so far in advance of the old line that a bombardment of the city would now be impossible without the previous capture of several of these forts. In 1870 the distance between the city and forts was not so great as to prevent bombardment without their capture by firing over and between them, but the new girdle of sixteen forts not only protects the city from bombardment but from investment as well on account of its great extent. Already in 1870 Paris was the most extensive fortress in the world. Since then it has been added to and strengthened in a manner absolutely incredible. The city is situated in the valley of the Seine. On the right bank of the river, at the city, a vast plain has been formed by the action of the water. At this point the Seine is one hundred and fifty yards wide. Paris was surrounded by a wall under Louis XIV. Under Louis Philippe (1840–45) this wall was greatly added to. To-day its irregular front includes ninety-five bastions and salients. The moat is dry, but can easily be flooded from the Seine. This principal inclosure is surrounded with the sixteen detached forts referred to. These are connected by a great number of intermediate works of less importance.

Notwithstanding these extensive preparations to resist an invasion and to prevent the capture of Paris, the question arises, *will* they prevent a fourth invasion of France? In the quite probable event of another war with Germany, will that nation try

to dictate again the terms of peace from the halls of Versailles? She will probably make the attempt; for such is the national pride of the Frenchman, or rather of the Parisian, that Prussian shells must actually begin to drop rather frequently into his favorite cafés before he will believe in the reality of German victories.

The author of one of the latest works emanating from a French military source, "Before the Battle," truly affirms that the quality of the men composing an army exercises an influence more decisive than can be claimed for all its implements of war. He further affirms that the French soldier has all the qualities which should make him the soldier *par excellence*. "His zeal, his vigor, his self-abnegation, render him to his adversary the most redoubtable foe. For vivacity of spirit, for active intelligence, for defiant bravery he is without a peer." The soldier, whose praises are so highly and characteristically extolled, appears to the curious foreigner, who beholds him in time of peace, as small in stature, slouchy in appearance and poorly "set up" by the side of his English or German neighbor.

The French soldier is allowed two meals a day, the first at nine o'clock in the morning, the other at four in the afternoon. Coffee is drank at sunrise. The privates mess in the same squad-room where they sleep, the tables being suspended by cords from the ceiling and hoisted up when not in use so as to be out of the way. Each man has bread enough issued to him to last three days at a time, and each one is provided with an iron basin called a *gamelle*, in which he carries his rations from the kitchen. Formerly several men ate out of one *gamelle*, but this social custom has fallen into disuse. Meat is served every day at the four o'clock meal. In addition to their clothing and subsistence, the French soldiers are paid one sou (two cents) a day. This is paid every five days, when it amounts to half a franc. Military service is now compulsory for all classes of citizens of twenty years of age, with some exceptions. The only sons of widows, the physically disabled, etc., are exempt. Those who are graduates of the Polytechnic, or who can pass a certain examination, are let off with one year of service. Political influence does not appear to count for much in excusing any class from this compulsory service. The line between officers of different grades and between non-commissioned officers and privates is very rigidly drawn. The captains and lieutenants messing separately, and

the non-commissioned officers not associating in any manner with the privates. A large proportion of the officers are promoted from the ranks every year, but candidates for commissions must first graduate at a military school near Paris, intended only for such candidates where the course takes two years to complete it.

French soldiers are permitted to ride in all public conveyances for half fare if in uniform, while at the theatres a soldier in uniform is, by custom, allowed to push by the long line of civilians, who may be patiently waiting their turn to buy tickets, and buy the best seats he can afford for half price. General Boulanger, when Minister of War, did much to raise the status and improve the condition of the French soldiers. His famous order permitting them to wear beards did more, it is said, to raise him in the estimation of the rank and file than any other of his official acts.

Reprints and Translations.

MODERN CAVALRY ON THE FIELD OF BATTLE.

By COLONEL R. S. LIDDELL,

Late Commanding 10th Royal Hussars.

(*Reprinted by permission of The Aldershot Military Society.*)

CONFIDENCE in one's own arm is most desirable and should be fostered, if at the same time we can learn how to work with the others, remembering that while cavalry give the information to and hide the movements of the army, while artillery shake and disperse the enemy's formations, and prepare the way for attack, it is the infantry alone who can assault and hold the positions, and it is for their advance, and to bring them up to the point that determines the battle in the condition most favorable to insure success, that all the efforts of the other two arms must be devoted.

I have made these preliminary remarks, as from my paper being entirely given to the action of cavalry it might appear that I am claiming more for that arm in the battle-field than is reasonable, but I wish it clearly understood that whatever I may say is only in an auxiliary sense to the action of infantry, and I trust that I shall not be thought underestimating other arms, while showing unbounded confidence in my own.

The necessary rest required by Europe after the exhaustion of the wars of Napoleon resulted in the long peace which succeeded the campaign of 1815. This, and the improvement that took place in fire-arms in the next forty ears, gave room for speculation as to whether cavalry would play as important a part in the future as it had done in the past under Marlborough, Frederick the Great, Napoleon, and Wellington.

The Crimean War helped to confirm the opinion that the days of cavalry had gone by. No account was made of the enormous distance by sea that the cavalry had to be transported, the unfavorable nature of the seat of war for that arm, the little scope given in a campaign that resolved itself into a siege, the smallness of the cavalry force employed, and the difficulty in keeping up a fresh supply of horses. After this war came the introduction and improvement in the breech-loader, and with it opinions were strengthened that cavalry duties would be still further limited, and its traditions for a time appear to have been lost.

The awakening from this transient period of theory came from a nation not trained to arms, and it is to the American Civil War that we owe the revival that took place in the use of the cavalry arm.

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The raids made by the Confederates under Morgan, Stuart, Forrest, and by the Federals under Sheridan, drew attention to advanced cavalry work, such as scouting, reconnaissance, outpost and dismounted work. As particular examples we may select Morgan's boldest and greatest raid in 1862, when he passed through Kentucky and Indiana, capturing large stores from the enemy. By his rapid and skilful marches the Federal officers were completely bewildered. He was absent from his own army twenty-four days, in which time he travelled 1000 miles, capturing seventeen towns, and destroying all the Government supplies and arms. In a second raid he forced the Federal Army to fall back, by taking possession of the railway in its rear which brought its supplies.

In October, 1862, Stuart made his greatest raid through Pennsylvania around the Northern Army. He set out with 1800 cavalry and four pieces of horse artillery and crossed the Potomac. The telegraph lines were cut in all directions, railways obstructed, and a large number of horses captured. and all the public stores and buildings were destroyed. His position at this time was very critical, ninety miles from his own army. He considered it less dangerous to return by the opposite way to which he came.

Forrest used his cavalry in every possible manner, dismounting in the battle-field and employing it as infantry. It also acted as cavalry. In October, 1864, during a raid he impeded the navigation of the Tennessee River, which was filled with Federal gun-boats. Choosing a strong position on the bank he masked his guns, and awaited the approach of the enemy's vessels. He captured a gun-boat and a transport, and manned them with his own men, but his naval expedition did not last long. Pursued by several gun-boats, he had to run his ships on shore, when the troopers gladly mounted their horses again. His object was, however, gained—inspiring alarm throughout the country and occupying a considerable number of the enemy.

Later on the Federals copied this system, when the raids of Sheridan, with his 10,000 horsemen, armed with the magazine rifle and revolver, with sword attached to the saddle, brought about the final overthrow of the Southern Army.

The next campaign that took place was in 1866, known as the "Seven Weeks War," when large bodies of cavalry were used by the Austrians and Prussians. This campaign was of such short duration that there was not sufficient time for the experience gained in the use of cavalry to be utilized while the war lasted, but when the war was over, both sides having bought their experience, set to work to reorganize their systems, and the course pursued by the Prussians after this campaign, in largely increasing their cavalry, was fully justified by the advantages reaped in the war with France in 1870.

At the close of the Franco-German War the attention of the whole of Europe was called to the successful use of the German cavalry during the campaign, more especially the advanced duties, when at times sixty miles in breadth and fifty in advance of the army were covered by the cavalry.

In England, after the termination of this war, many German military

works of great value were translated and published, the battle-fields in France were visited and described, every movement of both armies, strategetical and tactical, was studied. All this tended to draw our attention to the extended use of the cavalry arm in future campaigns, and the shortcomings of our own system were carefully scrutinized. The movements of our drill-book were simplified, the careful training of our men in shooting was more fully recognized, and the teaching of advanced cavalry duties, reconnaissance, outpost and dismounted work were gone into most thoroughly—in such a manner that I may confidently appeal to those officers who have the best opportunities of forming an opinion, whether our cavalry does not bear comparison now with what is being done in other armies, and in these matters is advancing in a satisfactory manner.

While all this good work has been going on (and I would be the last to say one word that might seem to depreciate its value), we may perhaps have permitted the action of cavalry on the battle-field to escape from sufficient notice. It is for this reason I will ask your permission to bring before you this subject, believing that, the opinions of all branches of the Service being brought to bear upon it, considerable advantage may be obtained.

It will be my endeavor to show, not by my own arguments, but by quotations from others, that cavalry still has an important part to take on the battle-field, and far from its duties ending when armies come in contact, that it is still reserved to them, as has been the case before to decide, perhaps by only one charge, the issue of a whole campaign. Prince Kraft, in his letters on cavalry says: "The battle of Mars-la-Tour, won by the bold employment of cavalry, made possible the blockade of Metz, and afterwards the surrender of the whole of Bazaine's army. So it may be said, without exaggeration, that the charge of Bredow's six squadrons on that day was the turning point of the Franco-German campaign."

Colonel Home in his "Précis of Modern Tactics" says, "The action of cavalry on the actual battle-field is by no means a thing of the past. The use of cavalry with skill at the right moment and in the right numbers has always been considered one of the most difficult problems in War. Modern arms have increased this difficulty manifold, but to say the day of cavalry on the field of battle is past is merely another way of saying that the knowledge of how it should be used is wanting."

Cavalry is apportioned to an army in two capacities: (1) Divisional cavalry, that is (if possible) a regiment or as many squadrons as can be spared, attached to each infantry division, acting under the orders of the general of the division; (2) the cavalry division, that is a large body of cavalry composed of several brigades, an independent body having its own commander.

On the march the division cavalry covers the head and flanks of its own division; on the field of battle it will be as near as possible to its division, in the most sheltered spot that can be found: in the early part of the battle it would be kept as much in reserve as possible, echeloned in rear of one flank of its own infantry. It would remain there until the artillery and musketry had effected their work, and the enemy's ranks had become

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thinned and shaken. Then when his infantry become tired and exhausted, under cover of the smoke the cavalry may be further advanced.

Prince Kraft says: "At Sedan the divisional cavalry were employed during the battle, charging by single squadrons, patrolling and reconnoitring to obtain information of the enemy and the ground. Every infantry body is accompanied by patrols, however small."

An instance of the too early employment of cavalry in a battle occurred at Waterloo, when Napoleon at the commencement launched his cavalry into the fight. The result was that, although it far outnumbered the English at first, it became so reduced, depressed, and worn out, that it was unable afterwards to offer full resistance to the British squadrons, who were comparatively fresh. Wellington, on the contrary, after his first successes, kept his cavalry, as much as possible, in reserve.

The field of battle itself shows the proper situation of cavalry, but the divisional cavalry on the defensive side must always be at hand to fall upon the flank of the enemy's infantry when in extended order, while that of the attacking side must be equally at hand to prevent the flanks of its own infantry being so attacked.

In discussing the action of divisional cavalry, the most advantageous time for its assisting in the combat must be considered.

At what moment, if any, can infantry be attacked by cavalry?

When opposed to a force acting on the defensive, divisional cavalry has its operations limited, and probably in the earlier part of an engagement, confined to watching, and, if possible, guarding the flanks of its own attacking infantry from surprise.

It is the cavalry of the defender's side that has the greatest opportunities. In both cases, however, a rule must be made not to attack infantry when it has taken up a favorable posltion, or before its ranks have been shaken by artillery or musketry.

Prince Kraft in speaking of Mars-la-Tour says: "This same day took place a series of cavalry charges of greater or less importance, which all showed practically to the cavalry the limits of their effective action against infantry. The advancing infantry were brought to a stand, infantry who gave way were ridden down, but where the cavalry attacked infantry intact, the cavalry were unable to prevail."

The precision of modern fire-arms has necessitated great changes in infantry tactics. To advance against the murderous fire of the present rifle, infantry is compelled to adopt scattered formations in small lines, and to move forward with sudden rushes. All this lends itself to the attacks of an active cavalry.

When these infantry attacks take place it may be presumed that they have already been under arms some hours, have marched some distance, and been exposed to considerable loss from artillery and musketry fire. Their advance to extended formation will have commenced at about 1000 yards or earlier. By this time the squadrons opposing them will have been brought to a more advanced position, to the nearest point to their flank where cover is afforded, and to carry this out successfully requires skilful leading. Files must be extended, and short rushes made with small bodies,

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say half a troop, if over exposed ground, into sheltered places. It is true that cavalry cannot hide themselves over exposed ground as infantry can, but they have one advantage that nothing can deprive them of rapidity of motion, and the distance that would take them, say ten seconds to traverse, viz., 150 yards, would take infantry a minute.

Prince Kraft writes: "No battle-field is a *tabula rasa*, in the most exposed country there are depressions. If strong skirmishing lines of infantry can advance directly over a country devoid of cover, cavalry can undoubtedly do the like if by making use of the lie of the ground they can gain the enemy's flank. A skilled cavalry leader will thus undoubtedly find an opportunity to get close to the enemy."

Having arrived at this more advanced position, say from 500 to 1000 yards, according to the formation of the ground, the nearer the better, the most favorable moment to assail the flanks of the attacking infantry would probably be immediately before the last halt of the fighting line and before the main body had reinforced them, as they are preparing for their last united rush and as their supports are doubling up to join them. At this moment the men would be to some extent out of breath, their attention would be fixed on the point about to be attacked, and their flanks would be neglected.

Cavalry should then descend upon them at the utmost speed that can be exacted from the horses, with a good interval from knee to knee. If there is only one squadron, one troop should take the flank of the fighting line, while the other throws itself upon the support. As the distance to be covered in the open will probably be not more than from 200 to 400 yards they will be exposed to fire, saying none of the ground is undulating, for fifteen to thirty seconds when at full speed. As they close on the infantry neither the supports or those in rear of them, or their artillery, will dare to fire on account of their own men. If the infantry run to get into small squares, as is most likely, the cavalry must endeavor to catch them before they assemble. If they get together, it may be too late for the cavalry to stop, they must then throw themselves upon them and trust to the supporting squadron to complete the attack.

Although it is rare that a battle-field is on such ground that there are no undulations to afford shelter for cavalry in an advanced position, this may be the case, and if so, the enemy's infantry attack must be allowed to take place, but even then by cavalry showing itself on the flanks for a moment, infantry would get together and afford a better mark for fire, and the progress of the attack would be delayed. The very appearance of cavalry frequently frightens infantry into masses. If the ground was too much exposed for the charge, men might be dismounted, with their carbines, at a safe distance, to assist the infantry. If mounted infantry were at hand they would be utilized in the same way and the machine-guns of the cavalry would also pour in their volleys.

If the enemy's attack is successful, cavalry must then advance on their flanks, and take its chance, and if necessary sacrifice itself to give its own infantry time to rally. If it is unsuccessful the cavalry must be ready to take every favorable opportunity of molesting its broken ranks.

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Speaking of Mars-la-Tour, Prince Kraft says: "During the battle a German infantry brigade was forced to retire with heavy loss, and ran some danger of being annihilated by the pursuing enemy. But the 1st Dragoons of the Guards threw themselves on the pursuers. The enemy's infantry massed round the eagles and ceased to press on, while the thinned ranks of our infantry were able to rally and our guns were saved and brought into position. The losses were heavy; half a regiment of cavalry (250 horses) were sacrificed in order to save a brigade."

At Waterloo a French division of infantry fled before three regiments of dragoons (the Union brigade). The Royal Dragoons and the Enniskillens in first line, Scots Greys on their left rear, the whole under Sir William Ponsonby, were acting in support of the Highland infantry brigade, awaiting the attack of the whole of the 1st French Division under General Alix. The three Scotch regiments threw into them a concentrated fire, and as they were staggered by the shock Ponsonby gave the order to advance. Passing through the Highlanders, the Greys having come up into line, the three regiments charged the leading portion of the French column, which yielded, and those in rear were hurled back. The dragoons having the advantage of the descent of the hill appeared to mow down the mass: the Greys on the left pressed on through the supporting brigade of the French, while the Royals drove back the right, giving no time for fire. Many threw down their arms, while hundreds of prisoners were hurried off to the rear of the line, at the same time the Enniskillens forced their way through the centre, when the remainder of the French division broke and fled.

It may be said that this took place before the introduction of the rifle and is, therefore, no example; but it took place within the range of the weapon then in use, and at that distance it was equally effective. The celebrated charge of Bredow's brigade at Vionville (Mars-la-Tour) also shows what an energetic attack may do.

It had become necessary to demand a sacrifice from the cavalry for the good of the army, to enable Prince Frederick Charles with only 24,000 infantry to hold in check Bazaine's army of 180,000, until his own main body came up.

Bredow's cavalry brigade consisted of six squadrons of the 7th Cuirassiers and the 16th Uhlans. They were ordered to make a breach in the front of the 6th French Army Corps. The six squadrons advanced in column, the Cuirassiers leading, when they received the word to change direction to the right, then to form line, which was done under a heavy fire. The Cuirassiers getting into line first, charged at once, the 16th following in echelon. In a moment, the batteries vomiting flames were reached with a loud hurrah and the gunners cut down at their guns, when the whole brigade, which had now got into one line, charged the long lines of infantry in rear who received them with a heavy fire from their chassepots. These lines, too, were broken through, and the main object of the charge was attained, but carried away by the ardor of the combat they charged and took the mitrailleuses, when the French cuirassiers, with a dragoon brigade in support, came down upon them and compelled them to fall back. This they did, having to force their way back through the enemy's masses of infantry

with enormous loss. The object, however, was gained and the attack of the French corps checked and never resumed.

The cavalry division covers the advance of the whole army and is a day or two in front of it. It conceals and guards the army while finding out the movements of the enemy. It collects information and is also used with horse artillery on great enterprises on the enemy's communications. Having finished the reconnaissance and covering the army on the day of battle, it falls back as the two opposing sides come into contact, and awaits further orders. On the battle-field it should be placed so as to suffer as little loss as possible—as a rule in rear of the flanks. How far must depend on the formation of the ground; if shelter is to be obtained, the nearer the front the better. If not, then some 2000 yards in rear of one flank would seem advisable. Its duties are to guard the exposed flank or flanks and rear of the army, while it watches the cavalry of the enemy. If within range of artillery, it should be kept on the move from front to rear. Its strength should not be wasted or frittered away on doubtful enterprises, as it may be required for some decisive blow, in pursuit, or in covering the retreat.

Prince Kraft, speaking of the battle of St. Privat, says: "On the 18th of August the gigantic fight of St. Privat took place. The cavalry divisions were held back in reserve, but the divisional cavalry took an active part. During the battle a squadron of hussars advanced and sent information of the enemy making a flank movement."

He also says: "At Sedan the cavalry division was kept in reserve."

The massing of artillery at the commencement of a battle must expose a long line with some weak spot to attack. If protected by cavalry then probably a cavalry combat will ensue.

Prince Kraft says: "The action of the masses of German cavalry at Mars-la-Tour excited wonder and admiration; they surprised the enemy's cavalry when in bivouac, they met and surrounded the hostile infantry in a threatening manner, and thus 8000 cavalry occupied 65,000 infantry until the Prussian infantry came up. The cavalry made no charges which could not have been successful, but carried out their task of occupying the enemy almost without loss. In the old days these squadrons would have charged and ridden down the infantry. The change is the result of the improvement in fire-arms."

During the early stages of a battle advanced parties under officers selected for the purpose, must be kept out from the cavalry division to watch the enemy's movements, and the information they should be able to afford should be invaluable to the general-in-chief. An engagement with the enemy's cavalry should not be sought, unless they are much weaker, but should the necessity arise the ground should be reconnoitred and every advantage of position taken to insure success.

The attack being determined on, the preparation for it should be carried out rapidly. Echelon movements have many advantages. They favor the formation of oblique lines, they also insure in a charge direct to the front, the bringing up of squadron after squadron in support. The attack of Vivian's Hussar Brigade upon the French reserves at Waterloo gives a brilliant illustration of this, and has been termed by Siborne the "Crisis of

Waterloo." This celebrated charge, intended to be in line, became virtually a charge in echelon of squadrons, in consequence of the rapid pace of the head of the column.

The movement of cavalry must be rapid and unexpected and bear the character of determined confidence; an effort should be made by manœuvring to come suddenly on the enemy's flank. A gentle declivity for the final charge must be sought. The rapid, vigorous and determined charge in line on to cavalry, riding knee to knee is what is required." The charge to be made effectual, the horses must be brought up in wind, the gallop must not be begun too early, when begun it must gradually be increased to a fast gallop, the final charge, for the last sixty yards, made with every horse extended. "Nothing then must be left to excite the spirit of enthusiasm, even to ferocity, then, and then only, the 'cheer' to be raised."

At Waterloo the charge of the Heavy Brigade, the 1st and 2d Life Guards and King's Dragoon Guards, with the Blues in support, is a good example of a successful attack on cavalry. The French line of cavalry, as it advanced, presented an imposing appearance. They had ascended the brow of the ridge when a vigorous fire from Ross' horse artillery was opened on to them. In the next moment their trumpets sounded the charge and they rushed to the attack, and as the cuirassiers approached the British squares the Heavy Brigade dashed into them. The shock was terrific. The right of the Life Guards being thrown forward, came first into collision. The right of the French was suddenly thrown out by coming unexpectedly on to a hollow way, and as they passed it the 2d Life Guards came full speed upon them. The French cuirassiers were driven back and pursued until the English brigade came under infantry fire.

The charge of the Heavy Cavalry Brigade at Balaklava, under General Scarlett, is another good example, when the Russian cavalry, receiving the British charge at a halt, were entirely overthrown.

One of the greatest difficulties after the charge is to know when and how to stop, and it is then that the squadron and troop leaders, well in front of their men, must use all their efforts to carry out the ends of the commander. I think this is a time when a strong whistle, carried by the commanding officer and the squadron leaders, can be used with good effect. Being an unusual sound it would attract attention.

The battle being over, some of the most serious duties of cavalry commence. If the army is victorious the pursuit has immediately to follow. History points out the difficulty in carrying this out. Uncertainty of the victory, or how far it can be counted on, often delays its commencement. Battles are often ended by nightfall, valuable time is lost, and the golden opportunities are past. An active cavalry leader will, however, without further orders, at least follow with his advanced parties, and not lose touch of the enemy. He will soon learn the condition of the enemy and act accordingly, harass his flanks and rear and play upon him with his artillery.

An example of another manner in which cavalry may be employed after a victory can be taken from the Egyptian campaign of 1882. When after the battle of Tel-el-Kebir, by a rapid advance of the cavalry some fifty miles

ahead of the infantry, the capital of the country was captured by the English cavalry division.

If the battle is lost, still greater are the responsibilities of the cavalry. Detached squadrons with scouts must be sent round the flanks to ascertain the strength of the enemy sent in pursuit, every available position must be taken up by the horse artillery and every advantage seized for counter-attack. Above all, accurate information must be obtained for the general-in-chief of the nature of the pursuit in order that he may not harass his main body by falling back further than necessary. This subject, however, is beyond the scope of this paper and is one of study of past campaigns.

Of the action of cavalry in savage warfare the recent campaigns in Africa have given some experience. In the presence of an enemy met with in such enormous numbers as in the desert, cut off from all help, knowing that unless you win you die, it seems to be decided that our infantry must adopt the square as the most suitable formation. In the Zulu War, the cavalry at the Battle of Ulundi was placed inside the square. The experience met with there was exceptional, and from the swarms of savages surrounding the square in all directions, it was considered desirable to keep the 17th Lancers in the centre of it, in order that they should not interfere with the infantry fire, and that when the enemy was repulsed they should be launched out upon them, and this was done with perfect success.

It is, however, contrary to the instincts and traditions of cavalry to be shut up in a square, and, where practicable, I should think cavalry outside a square, even at some distance out of the way of the infantry fire, acting with horse artillery, would very much disturb the attacking bodies of the enemy, and, perhaps, attract away a portion of them, and they could be brought up, when called upon to do so, to carry out the pursuit.

In the first campaign on the east coast of the Soudan, on the advance to El Teb and afterwards to Tokar, squadrons were sent in front and on the flanks of the square with scouts thrown out to feel the way and obtain information, while the main body of the cavalry was echeloned on the rear and flank opposite an angle of the square, in the most suitable manner, to avoid any interference with its fire. During the action it remained in this position until after the first attack on the square, when it moved away past the square on the outward flank and acted on the enemy's rear and engaged their reserves until the action was over. During the desert march in the Nile expedition the 19th Hussars, by its scouting, protected the square and gave it timely notice of the approach of the enemy. In a country where a great deal of bush abounds the effective charge of cavalry on to groups of savages is very much curtailed. The Arabs throw themselves on to the ground behind the prickly bushes, the ranks are opened out as the horses avoid the thorns, and the men get no chance of using their swords, but although much execution is not achieved under these circumstances, the natives have great fear of cavalry and they are prevented from attacking elsewhere. When their attention is thus occupied horse artillery and machine guns might make great havoc amongst them. At the action of Tamai where the ground, from the rocks and ravines of the neighboring mountains, was unsuitable for cavalry charges, when one of the infantry

squares was broken, the cavalry advanced and one squadron of the 10th Hussars dismounting, helped to create a favorable diversion by pouring fire into the flanks of the attacking Arabs.

My remarks would, I think, be considered incomplete if I did not touch on the question of cavalry charging squares, as this point is always made very prominent in all discussions on the action of cavalry. I therefore must not pass it by. I will say at once that I think it most undesirable, even under favorable circumstances, that cavalry should charge a formed square of men armed with the breech-loader. At best the gain can be but local and partial, while the loss to the cavalry, an arm so difficult to keep up in numbers, must be disastrous, and it seems to me that if cavalry by its appearance can force infantry to form square, it has done enough, and that the artillery, infantry and machine guns should do the rest. The necessity might, however, arise, and by looking at the past we see its possibility. At Langensalza, two Prussian squares were broken by the Hanoverian cavalry and the major part taken prisoners. We have only to turn to the recent campaigns in Egypt to see the effect of determined rushes of men intending to succeed, charging on to squares carefully formed on ground affording no shelter, with an enormous amount of fire being poured upon them. It will be said that these men were fanatics, but our cavalry, too, have been and will be fanatics in a charge, and I still think if the necessity recurs that an attack properly conducted on favorable ground, one troop charging on the corner of a square followed by another at double distance, others in echelon on both flanks immediately following, the whole charging with the greatest impetuosity, intending to win, will break down any square that Englishmen are likely to meet with.

If we look back again on the past we will find many instances of British cavalry not being called upon in vain to make a sacrifice. At Talavera the 23d Light Dragoons supported by the 1st Hussars of the German Legion advanced against the French squares. In their impetuous rush they came upon a hollow cleft covered with long grass eight feet deep and eighteen feet broad. Too late to pull up, the foremost rode headlong into it, some tumbled in, others over it, some rode boldly at it and gained the other side. Still they went on, swept past the infantry columns and fell upon a brigade of French chasseurs.

At Balaklava 670 British horsemen were launched against an entire wing of the Russian Army. The brigade at first in two lines, the 11th Hussars, 17th Lancers, and 13th Light Dragoons followed by the 4th Light Dragoons and 8th Hussars advanced down a gradual descent of three-quarters of a mile, the Russian guns vomiting shell and shot upon them, one battery bearing on their right, another on their left, and all the intermediate ground covered with riflemen. The guns were charged and forced through, the forces drawn up in rear were overpowered. They then had to turn, and retiring up hill ran through the same gauntlet.

In the Sikh War, at the Battle of Ferozeshah, the 3d Light Dragoons charged the enemy's entrenchments at a point defended by some of their heaviest batteries. When within 250 yards the regiment moved at speed under a destructive fire of grape and musketry, and pressing forward at

the charge entered the enemy's camp and captured the whole of the batteries.

Cavalry attacks have been made with success after dark and the advantage, of course, is gained of obviating opposing fire. Prince Kraft mentions that after the battle of Mars-la-Tour the cavalry division reinforced by the divisional cavalry rode forward to complete the advantages gained. It was almost night and fault has been found with making the attack in the dark. If the ground is well-known a night attack may be advisable. While criticising it, we have to think of the feelings of a half defeated army about to bivouac, being attacked by unknown forces in the dark. In this case, at Vionville, the enemy did not wait for a second, but withdrew and abandoned the whole field of battle.

Prince Kraft quotes the attack of Blücher at Gross-Gorchen and a cavalry attack at Soon.

During the first Egyptian campaign the Life Guards made an attack by moonlight at Kassassin.

I have now, I think, touched lightly on some of the most important cavalry duties on a campaign. In some points perhaps these remarks may appear contradictory. How to combine keeping cavalry in reserve for any great action it may be called upon to perform while using it unsparingly to assist on the battle-field, if the necessity arises. It may, however, be noticed, that much as they may be criticised, few cavalry commanders have been severely blamed when they have thought it best to take the bolder course.

To insure cavalry the power of carrying out its duties successfully in War, organization and practice in peace is most essential. Infantry may suddenly be increased, without much deranging its action in the field, but cavalry cannot be hurried into an increased augmentation. In tactics, simplicity in every evolution and rapidity in execution are the most important principles.

This simplicity of drill, I think, might be assisted if our squadrons were divided into four divisions, zuges, or pelotons. When squadrons have forty-eight files in the front rank there might be four of these, while weak regiments with thirty-six files could drill equally as well with three divisions. This system, introduced by the late General Valentine Baker into the English service for a time, and now used by all European countries, was found to work well.

I think the whistle could be carried with advantage by all cavalry officers. For advanced work attention can be drawn by it without being heard at a distance like a bugle. In movements the commanding officers would find it useful to call the attention of leaders to himself, especially in extended or echelon formation.

I have omitted to make much mention of the action of horse artillery combined with cavalry, as it seems beyond the limits of this paper, but it is one to which the cavalry officer's attention requires to be brought most strongly to bear. I would also have wished to have made some remarks on the many advantages to be obtained by having mounted infantry attached to cavalry. I understand that this force would be under the

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orders of the cavalry general, and if so, I think a cavalry division well found in horse artillery, with mounted infantry, whether conveyed on horses, or where the country admitted of it, on cars, and accompanied by machine guns on wheels, could act in such an independent manner as to enable it to penetrate far ahead into an enemy's country, or threaten his communications, and be absent from its main body for many days or weeks.

As regards the English cavalry, I think it may be said, without boasting, that the material is excellent. The men are of the best physique, recruited from a good class, and plenty of them to be had. The non-commissioned officers are intelligent and always ready for instruction. The riding compares favorably with cavalry of other nations; certainly far better than any I have ever seen abroad, either German, Russian, or French, and amongst all foreign countries we have the reputation of being the best horsemen in the world, which at all events has a good moral effect.

Our horses are undoubtedly, first-rate, having more quality and greater speed than foreigners. We have in our officers the exact stuff we want. Their very sports and amusements start them with all the makings of cavalry soldiers. But the quickness of eye, the self-confidence and readiness that these sports and games may give require nowadays, more than ever, something beyond this to produce the trained cavalry leader.

Cavalry is an arm of opportunity, and above all others depends greatly on its leaders, but with the chances now available of reading, in every detail, the campaigns of the past, if taken advantage of as is now daily becoming more common, we should produce in the future the best and most accomplished cavalry officers that this country or any other has ever seen.

I will now conclude my remarks in hoping that in the discussion that will follow, the many omissions I have made in this paper will be made good.

TACTICAL USE OF MOUNTED INFANTRY.

By CAPT. H. R. GALL.

(Reprinted from the Illustrated Naval and Military Magazine, London.)

THE prevailing idea that the next war will witness a still greater revival of the use of cavalry than seen in 1870 has been strengthened by the imposing display of squadrons at the recent manœuvres in Germany and also in France. How to meet the enemy's cavalry and to prevent it from obtaining an advantage at the outset will be a question of the most serious importance to that side which acts on the defensive in the next great war. One drawback to fighting the advanced cavalry of an army with cavalry alone is that it is liable, even when successful, to break up the cavalry divisions and to leave the victors (supposing them to have been vigorously opposed) without that preponderance of the mounted arm, upon which a brilliant success that would be decisive in the subsequent campaign would largely depend. It might be urged that this applies equally to both sides; but the supposition is, that at the outset of a cam-

paign the defending side is the weakest in cavalry, while, at the same time, it is important to stop the enemy's advance and prevent him from seizing the initiative. Under these circumstances, during the first stage of a war, any combination of troops that may be reasonably expected to delay the enemy's advance, without incurring too great a risk of using up the cavalry of the defending side, is deserving of consideration.

To fight cavalry with a mixture of horse and foot soldiers is nothing new. History repeats itself by the adoption in the English army of a combination of the two arms. The objection to mounted infantry has been that it combines the defects of two arms without possessing the highest qualities of either. This idea is entirely a wrong one, for it implies that mounted infantry are sometimes intended to fight on horseback; but mounted infantry are not dragoons. Well trained cavalry and artillery are more likely to succeed, when opposed by cavalry and artillery only, than if they were encountered by a skillful combination of infantry and machine-guns with cavalry and artillery. This combination is easier and involves less loss of mobility than has been generally supposed. For example, the advanced troops of an army might be divided into brigades, each representing a complete tactical unit consisting of

2 regiments of light cavalry.
2 batteries of horse artillery.
1 battalion of mounted infantry.
6 machine-guns.
100 trained and selected scouts.
Small-arm ammunition, tool and light baggage carts.

All reconnoitring to be performed by the scouts, who should be carefully trained to acquaint themselves rapidly with minute details of localities.

MOUNTED INFANTRY.—The principal fighting rôle belongs to the infantry, which arm, in order to be able to manœuvre with cavalry, must be superior to it in mobility; the men should ride lighter and be mounted on horses selected for speed and agility, but not intended to deliver a charge. This superior mobility is necessary to enable the infantry, when manœuvring with cavalry, to dismount in time to aid them with their fire. Mounted infantry should never fight except on foot, and should always endeavor to select positions favorable to the development of rifle fire. Dismounted and in action, they should only mount when about to be moved for distances exceeding half a mile. When mounted and manœuvring to get into position their movements should be exceedingly rapid. A dismounted escort should always remain with the horses of those who are fighting. A machine-gun may sometimes form part of the escort, especially in open country favorable to cavalry.

The fighting formations on foot will be those of infantry when acting against cavalry and artillery. Square may be formed to protect the horses if seriously threatened by the enemy's cavalry. Mounted infantry may gallop in open order to within 1200 yards of field guns in action, then dismount and advance in skirmishing order and attack them; they will, of course, always endeavor to attack guns in flank or obliquely. Mounted infantry need not be taught any cavalry drill; they need only be trained to

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ride over difficult country and to groom their horses. They should be constantly manœuvred in conjunction with the other arms, and be practised in engaging large bodies of cavalry; they should be taught to ride for the nearest cover, and to reserve their fire until the cavalry are within effective range. The effect of well-directed volleys delivered at short ranges should be constantly impressed on all ranks. Any probable enveloping movements of the enemy's cavalry ought to be forestalled by posting mounted infantry and machine-guns at certain pre-arranged places.

Mounted infantry, presuming that they are good shots, should be constantly impressed with the idea that they ought to have nothing to fear from cavalry.

MACHINE GUNS.—Machine guns should be attached to limbers and thoroughly well-horsed. Their mobility should be amply sufficient to enable them to co-operate with each arm as required. In selecting positions for machine-guns, especially when pushed forward, great attention should be paid to getting as much cover for them as possible. The tactics of the cavalry and artillery will be the same as usual for these arms when co-operating with infantry, or acting alone.

TACTICS OF THE FOUR ARMS COMBINED.—The position of the cavalry and artillery will usually be on the flanks of the infantry, taking care not to advance beyond the support of the latter, unless ordered to do so by the commander of the brigade. In like manner until the enemy's squadrons have been broken up, the artillery should rarely be advanced beyond the protection of the infantry. The cavalry, as a general rule, should not charge until the enemy can also be engaged by the infantry, but should rather be encouraged to manœuvre so as to bring the enemy under the fire of the infantry and machine-guns.

When scouts are out they should be supported by small detachments of mounted infantry. When reconnoitring, the movements of cavalry and artillery are generally restricted to the roads. Mounted infantry, on the other hand, can always dismount, and should act off the roads if necessary. So long as movements are restricted to roads mounted infantry have a great advantage, and ought always to be able to check cavalry whenever the country is enclosed and difficult. Should the country be very open, the formation to meet cavalry and artillery might be as follows:

Infantry in the centre; first line dismounted.

Supports, or second line, mounted; in rear of the flanks of the first line.

Third line mounted; manœuvring on the most exposed flank.

Machine-guns acting with the infantry should unlimber whenever their long range fire is likely to be effective.

The cavalry manœuvring on the least exposed flank should endeavor to regulate their movements by those of the infantry, unless charged by the enemy's cavalry, when the infantry must support them with their fire.

Artillery should come into action wherever it can best co-operate with the other arms. Where machine-guns can go, light carts carrying ammunition and intrenching tools can follow, and the advance of cavalry might frequently be checked by holding villages situated at the junction of main roads. For putting a village into a hasty state of defense, no combination

of troops could be more desirable than mounted infantry and machine-guns, with cavalry and artillery co-operating outside on the flanks.

It has been urged that dragoons can satisfactorily perform the work of mounted infantry. This is not true; dismounted dragoons at best make inferior foot soldiers, and are very little, if at all, superior to their opponent's cavalry, if they dismount to do their heavy fighting on foot. On the other hand, there ought to be no fear of properly trained mounted infantry ever becoming inferior cavalry.

The utility of mounted infantry in wars with savages, especially when long distances have to be traversed in desert countries, is so obviously apparent that it needs no comment.

LIEUTENANT FISKE'S POSITION-INDICATOR.

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IN our issue of February 8th, we described Lieut. Bradley A. Fiske's invention for finding the distance of far away objects. We shall now proceed to describe an invention by the same officer whereby not only is the distance and exact position of a far away object determined, but whereby also any number of guns located at different points and at various distances from that object and from the instrument may be directed upon the object with certainty and dispatch, though enveloped in the impenetrable smoke of battle.

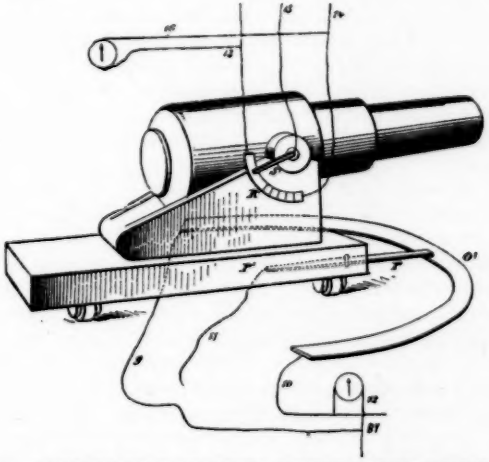

FIG. 1.—RANGING GUNS BY LIEUT. FISKE'S POSITION FINDER.

The invention has a special reference to forts containing a number of guns variously disposed. That a mere distance-finder does not meet the

necessities of a fort will be evident from a glance at Fig. 2, from which it will be seen that the gunners at *C*, *D* and *E* are benefitted little by knowing how far away the enemy's ship is from the instruments at *K* and *L*. The men at each gun must know how far the target is from that gun and in what direction; evidently the knowledge of the direction and distance of the target from *C* will help the gunners at *E* very little.

The present practice in most of the nations of the world is to divide a harbor and adjacent waters into imaginary squares, each square being, say, one hundred yards on a side, and these squares are numbered. Two telescopes are situated at the ends of a known base line, and these telescopes are electrically connected with a protected room, in which is placed a chart representing the fort and the adjacent waters, and carrying two long pointers arranged to sweep over the chart, and pivoted at the points representing the two telescopes. The men at the telescopes direct them continually at the target, and keep the officers at the chart constantly advised as to how their telescopes are pointing. The officers at the chart then point the pointers in the same direction as the telescopes are pointed, and therefore the intersection of the pointers on the chart represents the intersection of the lines of sight of the telescopes, that is, represents the target. The officer then notes the number of squares on which the pointers intersect, and signals to the guns this number. The officer in charge of each gun then consults a table to ascertain how he must lay his gun to fire into that square, and trains and elevates his gun accordingly.

This plan is a fairly good one if the enemy is stationary; but if he is moving it has a number of defects; although even if he is stationary, the squares, of necessity, are too large to admit of very accurate shooting. If the enemy is moving the additional difficulties of the above plan arise from the great time lost between the instant at which the position becomes known to the officers at the chart and the instant at which the gun is finally elevated and trained. Another is, the number of different errors that may arise; these are, first, the error in noting the square at which the pointers intersect; second, the error in signalling the square; third, the error in reading the signal, fourth, the error in consulting the necessary tables; fifth, the error in transmitting the instructions to the men as to how to train and elevate; and sixth, the error in laying the gun according to those instructions, both in azimuth and altitude. To avoid any inaccuracy owing to the time that is lost, Major Watkin, by his method, predicts the position in which the enemy will be, say in half a minute, or a minute in advance, and the guns are got ready to fire when the signal is made that the predicted position has been reached by the enemy's ship. Now this feature of predicting entails several chances of error, necessitates a speed-measuring device, and also necessitates a preconcerted division of the harbor into squares, or otherwise, so that position points can be readily designated.

By the plan here described all these sources of error and delay are avoided, and the men at each gun receive continuously, instantaneously and automatically a signal of what is to be done, given in a way that entails no noise, and which cannot possibly be misunderstood.

The value of the device comes into especial prominence if we remember

that it is absolutely necessary to locate and indicate the position, not only of one, but of several ships. A position indicator should be attached to each group of guns; then these different groups can be concentrated on one ship, or made to fire at different ships according to the judgment of the commanding officer.

Referring to Fig. 2, *A B* represents a line of the parapet of a fort or other defensive work. *C*, *D* and *E* are guns located in the fort and commanding the area which includes the position of the target *F*. The object to be attained is to lay all of the guns, *C*, *D*, *E*, correctly upon the target, although the persons in charge of the guns may be unable to see the target and be ignorant of its bearing and distance. For purposes of clearness, in the following description we shall refer only to the necessary operations

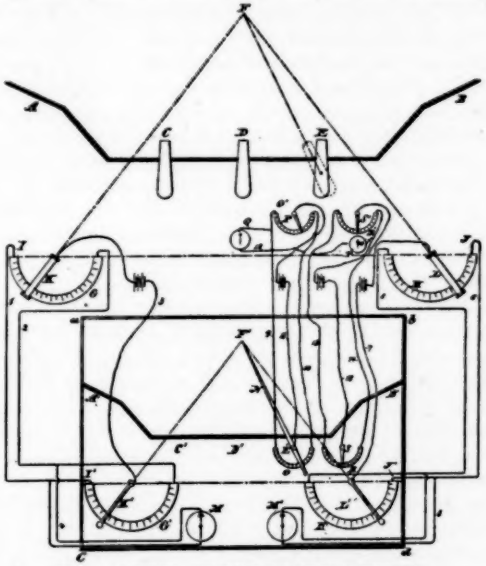

FIG. 2.—LIEUT. FISKE'S POSITION FINDER.

connected with one gun, as *E*, premising that the same method is followed in connection with every other gun.

G and *H* are two arcs of conducting material placed symmetrically with respect to a base-line *I J*. These arcs are located at stations distant from the positions of the guns, and so situated that a view of the area to be protected by the guns will not be cut off from the stations by smoke, points of land or other obstacles. For this reason it is better that elevated positions should be chosen for the stations.

K and *L* are two pivoted telescopes, the free ends of which move over the arcs *G* and *H*, and constantly maintain electrical contact therewith. These telescopes may be directed upon the target *F*, which will, therefore, be at the intersection of the two lines of sight of the telescopes.

Located at a station distant both from the guns and from the positions of the arcs *G H*, and usually at a place safe from the effects of the enemy's fire, there is established another station, which for convenience, we will call a "directing station," in which is a chart or map, represented by the rectangle *a b c d*. On this chart the line *A' B'* represents the line *A B* of the parapet of the fort, and the points *C' D' E'* correspond to the centres above which the guns *C D E* are laterally turned. The chart *a b c d* represents the area within the range of the guns *C D E* on some definite reduced scale, so that distances taken on the chart represent actual distances. On this chart is drawn a line *I' J'* corresponding to the base line *I J*, and symmetrically disposed with reference to that base line are arcs of conducting material *G' H'*.

K' and *L'* are pivoted arms similar to the arms *K L*, the free ends of which pass over and make constant contact with the arcs *G'* and *H'*. Arc *G'* is similar in form and in electrical resistance per unit length to the arc *G* and the arc *H'* is likewise similar in the same particular to the arc *H*. Extending from the extremities of the arc *G* to the extremities of the arc *G'* are wires 1 and 2, and extending from the pivoted telescope *K* to the pivoted arm *K'* is a wire 3, which includes a battery. Connected in loop from the wires 1 and 2 by a wire 4 is a galvanometer *M*. It will be evident that the wires 1, 2, 3, 4, the arcs *G G'*, the battery and the galvanometer *M* are connected in circuit in the form of a Wheatstone bridge, and that the effect of moving the telescope *K*, for example, to the right on arc *G* is to increase the resistance in the member 1 of the bridge and decrease it in the member 2, and that the same is true of a similar movement of the arm *K'* over the arc *G'*. Therefore if the telescope *K* be set at a certain position on the arc *G*, it is simply necessary to set the arm *K'* to such a position on the arc *G'* as that the galvanometer *M* shall show no deflection, when the bridge will, of course, balance, and therefore the angle made by the arm *K'* to the base line *I' J'* will be equal to the angle made by the telescope *K* to the base-line *I J*. The extremities of the arc *H* are connected to the extremities of the arc *H'* by wires 5 and 6, and the pivots of the telescope *L* and arm *L'* are connected by wire 7, which includes a battery.

M' is a galvanometer included in loop 8 from the wires 5 and 6. It will be seen that this arrangement of the two arcs *H*, *H'* and circuit connections is the same as that of the arcs *G*, *G'* and associated parts, and that therefore when the arm *L'* is placed at the same angle with reference to the base line *I' J'* as the telescope *L* is placed with reference to the base line *I J*, the galvanometer *M'* will show no deflection, and the bridge will balance, as in the preceding case. It follows, therefore, that if the two telescopes *K* and *L* be sighted upon the target *F* by observers located at the telescopes, and if a third observer moves the arms *K'*, *L'*, and at the same time watches the galvanometers *M*, *M'*, he will have placed the arms *K'*, *L'* at precisely the same angles as the telescopes *K*, *L* when both galvanometers show zero reading. Inasmuch as the chart *a b c d* bears a definite proportion to the area which includes the position of the target *F*, it follows that if the axes of the arms *K'*, *L'* be prolonged they will intersect at

the position *F'*, which would represent on the chart the actual position of the target *F*.

Upon the chart *a b c d* are pivoted three pointers, only one of which, for convenience, is shown at *N*, and these pointers are pivoted at the points *C'*, *D'* and *E'*, which, as already stated, correspond to the centres of horizontal motion or train of the guns *C D E*. Consequently, if the pointer *N* be turned on its pivot, it will correspond to the positions of the gun *E* when that gun is turned on its pivot.

One arm of the pointer *N* is long enough to sweep over the area which includes the target, and it is connected to the intersection of other pointers by a slotted pivot, so that it is automatically made to point in the direction of the target. At the gun itself is an arc *O'* and pointer *P'*, which, by the principle above explained, always shows how the pointer *N* is pointing. The distance from the pivot *E'* to the intersection of the pointers on the chart is marked on the graduated pointer *N*, and can at once be signalled to the gun *E* by means of the arc *R* and *R'*, according to the same principle.

Or, if desired, the resistance from *E'* to *F'* may at once be signalled automatically, according to the same principles. The action of the apparatus is much facilitated, however, if the arcs *P* and *R'* are attached to the gun itself, as shown in Fig. 1, so that the gun itself is moved instead of the pointers, and the man in charge of the training of the gun has simply to watch one galvanometer, while the man in charge of the elevating of the gun watches the other galvanometer. It is evident that both of these men can, by keeping the needles of their galvanometer at zero, keep the gun always properly trained and properly elevated, even while it is being loaded, so that the gun will be ready to fire immediately. It is evident that any number of guns, as *C* and *D*, may be controlled in the same manner, so that the mere automatic action of the apparatus gives to the men at every gun the most simple and accurate instruction possible as to what they are to do, and that no reading of scales is required.

The *raison d'être* of this invention arises from the fact that the modern guns in Europe are tremendously expensive, some costing $100,000; that each shot is terribly effective, and that it costs hundreds of dollars to fire each shot. It is, therefore, absolutely necessary that there should be no delay in firing and that each shot should hit the enemy.

LETTERS ON ARTILLERY.

By PRINCE KRAFT ZU HOHENLOHE INGELFINGEN.

Translated by MAJOR W. L. HASKIN, U. S. A.

XI.

GENERAL VON HINDERSIN.

MY examination of the means by which the Prussian artillery made so great an advance between 1866 and 1870, can hardly be said to be complete until I have spoken to you of one man in particular, and of him I shall speak even if by so doing I expose myself to the charge of inconsistency, for I certainly did begin this correspondence with the declaration that I would not examine as to which men, but only as to what facts, may have brought about this advance.

It is clear that in an army such as ours in which discipline is the vital element and even the foundation of existence, an arm could not be brought with this uniformity to such a state of perfection in all its parts in the space of four years, if it had not found at its head a man capable of impressing upon it the only right and proper direction. Had the movement started from below, that is, with the majority of the officers of the army, this advance would have met from the minority,—from a certain number of the minority, —some greater or less resistance which would have prevented it from reaching its greatest development. But the impulse came from the inspector-general himself,—from General von Hindersin; and it was he who was the soul, the master mechanic, of the reform which was brought about in the artillery after 1866.

It is true that he found on all sides those who were disposed to listen, hands ready and willing to be put to work. for every one felt the need of these reforms; but it was Hindersin himself who presided over and who directed them. It is he who brought about that unity in the numerous and divergent ideas and propositions which was the chief and essential thing, and it is he who put activity into the movement and hastened the completion of the transformation of the arm. While higher authority made continuous effort by means of orders and criticisms to give the artillery its proper tactical employment, Hindersin modified the system and course of instruction of the arm so as to make it possible to employ it as it was desired that it should be. He forged and polished the arm while higher authority indicated the manner in which it should be used.

This man placed at the head of the artillery was a most original character. The son of a poor pastor, he had received a complete course of instruction which educated the heart as well as the intellect, but he had been obliged to make his way in life by severe labor amidst great privations. Doubtless it is this labor and these privations which, while giving him an iron will, caused him to turn aside from the pleasures of society and to have

no wish to acquire the polished and polite forms of social life. He took pride even in never appearing, even at balls, in other than ordinary calfskin boots.

During the early part of his military career, which he entered upon soon after the end of the War of Liberation, he served under officers of the old school, and he imitated their rough and unpolished ways. Although his education was very extended (he was strong in mathematics, in physics, and in chemistry, and knew the French and English languages) he made little of the "scientific" attributes of the arm. He placed a much higher value upon knowledge of the tactics and practical skill than upon science. He followed the example of General von Enke, by himself putting in practice his adage "The day has twenty-four hours to devote to the Service.' He required much also of others.

He was of a passionate and violent disposition, and his choleric humor was increased by the impatience which consumed him to see his work advance. This great impatience was due to the fact that he was convinced that he would never see old age. His father and all his brothers had died of disease of the heart before reaching the age which he even then had attained, and he himself expected to die from day to day. But before death struck him he was determined to see realized the results of the activity which he had displayed in his position at the head of the arm. Thus there was produced in him a feverish activity which drove all his subordinates to display on their side their greatest zeal.

Many of the reforms were accelerated in this way, although from time to time the too great precipitation with which he acted had injurious effects.

A story is told of him which paints well his character and the fever which consumed him. He had just directed one of his aides to draw up a very extended report, one which presented many difficulties. The young man was looking downcast at the thought of the numerous days and the great trouble the work would cost him. "There is no hurry, you can dine before you set to work," said the general.

As with all men of quick temper he had at bottom a very kind heart. He was full of kindness to men and he loved his numerous family, but he did not believe it worthy of a *militaire* to show that he had a soft heart and it seemed good to him to show roughness and insensibility even towards his family. His oldest son died of a wound received at St. Privat, having languished and suffered several months. He said but this: "The lot of this young man is worthy of envy. A young officer could find no more beautiful death to die than his. With one hand in his mother's he held in the other the iron cross." He said this in the same rough tone with which he addressed words of blame to a subordinate, but a light trembling of the chin betrayed the profound emotion which filled his heart; then his features became more rigid, more severe yet than they were ordinarily, and he proceeded to discuss affairs of Service.

His features were harsh and austere; the face, large and bronzed, was surmounted by a high and wide forehead and surrounded by whiskers of a reddish blonde color. The moustache was of the same shade. He was thickset in figure and of medium height and his bearing was as rigid as his

features. He seldom laughed and had but little taste for pleasantry. When the officers organized an amateur troupe which performed a comedy he was capable of rising in the midst of the play and going away, saying: "This is altogether too foolish." He did not try to make himself popular,—did not care to be loved, as indeed he was not. The great majority of his subordinates feared him. Among themselves the young officers called him "the statue."

However much he chose to give himself tyrannical airs his family knew well how kind his heart really was. I could tell you of many instances in this regard which have been told me or to which I myself have been witness, but these are the details of private life with which the general public can have no concern.

He did not like to bestow commendation. He feared that praise would paralyze the zeal of his subordinates. When he was constrained to give it he preferred to diminish it either in his peroration or in his exordium. Eloquence was by no means his strong point and it could easily happen with him that after having weakened the praise he intended to give in the exordium he still further diminished it in the peroration, leaving out entirely the real praise he meant to bestow. Thus one day in the presence of the corps of officers he said of a professional paper read by a young officer which had really pleased him: "Although I am not absolutely of the same opinion as the reader upon all the points of which he treats, I have nevertheless many reservations to make." The officer felt mortified and asked me shortly afterward whether after such condemnation he should risk going on with his paper, for it was to have been continued at other meetings. I asked Hindersin, when I was alone with him, what had displeased him that he should have expressed himself so strongly against this paper. My question caused him great astonishment, for he really believed that he had greatly praised the young officer. At the succeeding meeting he took the opportunity to remove the false impression given and pressed the young man's hand while expressing his thanks and approbation of his effort. To me personally it has happened in this same way that he has said the rudest things, all the time believing that he was approving my view of the subject under discussion.

Without being, properly speaking, either near-sighted or deaf, Hindersin had not very excellent eyesight, nor was his hearing of the best. Whether through this or through sorrowful experience he had become suspicious, I know not, but he exhibited both towards his subordinates and to the troops a distrust which often showed itself in a most regretable manner, and was the less flattering to those to whom it was directed in that he expressed it always without the least tact. It was his practice not only to inspect troops but to spy upon them, for he believed it always possible for the attempt to be made to make him take the appearance for the reality, and that his orders might not always be obeyed exactly as he had given them. On one occasion he inspected a body of troops placed under my orders at the time of the practice firing. When I wished to execute certain manœuvres he said to me that it was not worth while. "I have seen them," he said, "these eight days, and I am satisfied." I said that I begged

him to pardon me for not reporting to him before, as was my duty, adding that I had not known of his presence. "You could not know," said he, "that I was present. I was in the forest and followed the manœuvres with my glass. I wished to see how you executed them when I was not present."

At another time he had appointed six o clock in the morning as the hour when he would begin an inspection. It was in the middle of summer and the heat was stifling. From sunrise—that is to say from half past three o'clock—he was upon an eminence in the forest observing by the aid of his glass our preparatory manœuvres, our march to the front, the manner in which we stationed our pieces. He had reached that position from Berlin under the cover of night without being seen by any one. When finally he was discovered in his hiding place I went forward and reported that the brigade had executed the preparatory manœuvre. "You report to me," said he, "only when you are about to open fire. I am not yet here officially. I am here because I choose to take a ride on horseback in the freshness of the morning."

When he inspected he required always that the field works for the batteries should be thrown up during the night, but he did not follow the course of his predecessors. They had been content to see the work begun and then to go away. He remained there all night and at daybreak he caused the troops to open fire from the battery just constructed, so that it could not have been possible to accelerate the construction by any unauthorized means. One of these days of inspection began the evening before at nightfall, and lasted until after noon. He exhibited on these occasions an enormous tenacity and very great control over himself. On the occasion when he made his first inspection as inspector-general at Magdebourg, in 1864, he had his foot bruised and the medical officer forbade his mounting a horse. He continued his work of inspection nevertheless, although enduring very great pain.

A man of such a character inspires a most indefatigable zeal in his subordinates if only by the example he sets them. But whoever had not a conscience entirely clear—whoever had to reproach himself with the least negligence, the least failure in his duty—that one trembled before Hindersin, for he could be sure that he knew well how to discover his shortcomings and would certainly bring them to light.

I cannot deny that at first I did not like to have to do with him, for he inspired me with a sort of inquietude, but when later I had really come to know him and was convinced of his honesty and of the purity of his intentions, I saw him willingly, and knowing the excellence of the fruit hidden within the rough envelope I learned to disregard the husk.

His intentions were invariably honest and pure. He feared nothing so much as to be guilty of showing injustice to any one. I could name one of the officers under his orders whom he deemed incapable, but until the day of his death he hesitated to act in conformity with this belief. In his youth he had had a duel with him and he feared that the repulsion with which he inspired him, the low opinion which he had formed of him, could not but exercise a too strongly marked influence upon his judgment of his capacity.

XUM

Although a man of former times, and in some sort of the old school, he welcomed nevertheless all new inventions, every new idea. He welcomed with much zeal and enthusiasm even the novelties which were brought to his knowledge, and when the objections to the novelty were shown him, when it was discussed or objected to, he might even fly into a passion, but he never bore malice to his opponent. Far otherwise. He weighed very carefully all the objections advanced, and if finally convinced of their validity he very quickly dropped the novelty for which he had for a time been so enthusiastic. But if, after having well considered the subject, the new proposition appeared to him worthy of being put in practice, then he set himself to work with that tenacity of which he alone was capable to place it upon a firm foundation.

In order to be able to appreciate, according to their merits, all the new inventions produced within the domain of his arm, he not only reported upon all new inventions, but took part in all the discussions at Berlin upon subjects relating to military science, and he sometimes found, even in the crude ideas of the young officers, something that was valuable and likely to be of permanent service. During the winter he even went so far as to cause periodical meetings of all the general officers and superior officers of artillery in one of the halls of the artillery school at Berlin, and required them to make reports upon the most recent inventions of officers of the practice school, and of the artillery commission for trials and experiments. But he very soon ceased to require this, because he quickly acquired the conviction that these officers were too old to be assembled in recitation halls, and that it was requiring too much intellectual labor from them, but this undertaking was none the less an evident proof of the great zeal which inspired him.

But all his actions, all his decisions were dictated by a dominant sentiment,—his attachment to his monarch,—and this attachment was boundless and showed itself in a profound veneration for the sovereign who was at the head of our armies in the campaign we had made. This veneration is general, is felt by all, and would not constitute a special merit and not even be worthy of special mention if it had not with General von Hindersin, as with few other men, constituted the basis of even the most insignificant of his actions and of his decisions, and if he had not manifested it upon the slightest occasion.

Such a man was well constituted to discover the defects of the arm, to remedy them, and to accomplish the great transformation it has undergone.

In 1864, Hindersin was charged with the direction of the artillery before the redoubts of Düppel. Having brought the siege to a victorious conclusion he was named the second inspector-general of the artillery. At that time the first inspector-general was prevented by sickness from leaving his study, and a few months later was obliged to give up active service. Hindersin took the succession.

During the siege of Düppel the enormous superiority of the rifled pieces over the smooth-bores had been universally recognized, as all who were spectators of those events know very well, but at this time the intro-

duction into our army of rifled pieces had in some way met with a check. Three-fourths of our field pieces were smooth-bores, and but one-fourth were rifled. The rifles were six-pounders. A single experimental battery of four-pounders had taken part in the war. No final determination had been reached upon the adoption of the four-pounder, or upon the increase in the number of rifled pieces, or upon the suppression of the smooth-bores.

The first thing Hindersin resolved to bring about, was the change to rifled pieces exclusively. This is the moment when I was first brought into contact with him. He came to find me. I was very much surprised,—I, a very young field officer,—to receive a visit from a general officer of such rank. My astonishment increased when I heard him say that since his nomination to the position of inspector-general he had been unable to sleep and that I could give him back his repose. Then he told me his thoughts concerning the rifled pieces. He said that they were so superior to the smooth-bores that it was absolutely necessary to have them in our artillery, and then went on to give me his reasons for insisting upon the necessity of being armed with rifled pieces only in case of any future campaign. He said that if he did not do in this respect everything that was in his power to do, and if Prussia, while her field pieces are still three-fourths smooth-bores, were led into a great war with a power armed with rifled pieces only, she would probably lose a decisive battle. But the loss of a decisive battle might bring about the loss or destruction of our country. Then, if he had not done all that lay in his power to procure the adoption of the rifled pieces, if he had been guilty of the least negligence, this negligence, this omission on his part, might cause the loss of his country. This thought weighed like a mountain upon him and took from him his sleep. He, therefore, begged me to obtain for him an audience with His Majesty that he might demonstrate to him the reasons why he deemed it necessary to increase the number of rifled pieces.

What he asked was easy for me to obtain, for it was one of my duties (I was then aide-de-camp) to announce to His Majesty the heads of departments of the army whenever they expressed a desire to see him.

Hindersin made known his views to the supreme chief of the army. Other personages took part in the discussion. They brought forward the reasons why the smooth-bores should not be wholly suppressed. They insisted upon the fact that canister fire with smooth-bores was superior to that with rifles. They cited the fact, as I have said in a preceding letter, that the United States had continued to make one-fourth of its pieces smooth-bore, of a pattern similar to our short 12-pounders. In spite of all objections the arguments of Hindersin prevailed with His Majesty. In June, 1864, the order was issued to introduce as many four-pounder rifled pieces as the foundries were capable of producing.

You know that when the material used is cast-steel, this fabrication requires time. When, therefore, at the end of a little less than two years the event occurred which Hindersin, with his great political sagacity had foreseen, the half only of our smooth-bores had been replaced by rifles. At the end of a year and a half, that is, at the beginning of 1866, each army corps had eight of its sixteen batteries armed with rifled guns. Four batteries

in each were six-pounders and four were four-pounders. As soon as the political complications in 1866, rendered a war with Austria probable, Hindersin resolved to accelerate the transformation of smooth-bore batteries into batteries of rifles.

According to the principles of administration then in force it was considered necessary, in order to make good possible losses, to hold in reserve a certain proportion of the armament, and, in consequence, of the rifled pieces. Hindersin brought up again his argument of a decisive battle. "In this war," said he, "there will be one of them, and if you gain it you will not need to replace the rifled pieces which may have been destroyed, for after that you will not need so much artillery."

He obtained authority to transfer all the rifled pieces of the reserve to the army in the field.

In this way, shortly before the beginning of the campaign, two batteries in addition to the eight already in each army corps were armed with rifled four-pounders, and ten-sixteenths of our field artillery consisted of rifled batteries when the war broke out.

He was not a man to be stopped by any objection when once he had reached a final determination. When the objection was raised that the batteries did not know how to use the new arm he replied: "Let them fire as badly as they can with the new pieces, they will still fire better with them than with the smooth-bores."

There was scarcely time to instruct the batteries even superficially in their use. Each one had one day's practice in firing with shell not charged, then they started for the field of operations.

Hindersin had foreseen rightly. A single decisive battle ended the war. The batteries transformed at the last moment and in such haste did good service. If you follow in the staff history the numbers of the batteries you will find that many of the 15th and 16th batteries of 4-pounders (these were the numbers borne by those which had been transformed just before quitting garrison) distinguished themselves and that in all cases they did not fire worse than the other rifled batteries. Those batteries which did not come into action in 1866, in the different engagements and in the decisive battle, were chiefly, or at least the great majority were, of those armed with smooth-bores. At the termination of the War of 1866 all the batteries which still had smooth-bores were provided with rifled pieces as fast as the funds necessary for the purpose were appropriated.

With that energy which nothing seemed able to daunt, Hindersin immediately devoted himself to the creation of a school of practice for the artillery. At the siege of Düppel he had observed that the artillery practice of the troops armed with the rifled pieces was not nearly so accurate as it should have been according to the statistics furnished by the inventors. Some of these were present by invitation at the siege and wherever they had indicated in a battery the proper manner of using the pieces the practice had immediately shown better results. When he inspected the schools of firing for the first time in 1864 he found that there, also, the troops were far from obtaining the results which the new pieces were believed to be capable of giving.

He was the first to make the results of the firing the chief test as to whether the troops were more or less efficient. While he criticised as usual the evolutions, the movements, the general efficiency of the battery, he required also a table of the results of its target practice to be furnished him and when he received this continued his criticism in saying: "And now, gentlemen, we come to the essential matter—the thing in view of which we are all here, that is to say, the results obtained, the number of hits." Then he would read the results from the table and continue, "According to the information given by the *Prüfungs-Kommission* there shall have been such a percentage of hits, to-day there has been such a percentage." All the officers drew long faces, for the results obtained were always very poor indeed. The general then continued dryly and shortly: "These figures say enough, I will not add a word. We shall have to change all this." By way of consolation he would say confidentially to the chief of this or that battery that none of the other batteries had obtained any more brilliant results, but would add: "Why does the infantry obtain results so much superior to these? Because they have a school of firing. I must have one for the artillery also."

From the moment when he entered upon his duties as inspector-general of the artillery he repeated, as the Roman orator, this *ceterum censeo* at the end of each of his criticisms, in each of his conversations with the supreme chief of the army: "I must have a school of practice."

And he established one. At the beginning it was not a grand affair. He could not create at once a special corps. To do that new credits must have been opened with the budget and the Chamber of Deputies must vote them. The systematic opposition of the majority at that time prevented further expenditure. This opposition had produced the effect which was then known as "The situation without budget." But this situation did not prevent Hindersin from effecting that which he believed to be absolutely necessary. He created a school of firing composed of officers who volunteered for it. After having insisted upon the necessity for the school, having declared that he was sure that all officers would make voluntary sacrifices to attain that end, he designated the first students of the school of firing. They all responded to his call and themselves sustained the expense necessary for the establishment of the new institution.

Thus was established the first school of firing in imitation of the English school, composed of superior officers already well advanced in years, of young and of old captains, who all with their own hands executed the service of the field and of the siege pieces in order to acquire the skill requisite for their management. But this was still insufficent. It was soon plainly evident, as every artilleryman already knew, that next to the correct service of the piece by the cannoneers the main difficulty lies in the correct observation of the effect of the firing and in knowing how to make the changes necessary to obtain the required range. To learn what to do to vanquish this difficulty it was requisite that they should be exercised as commandants, and in consequence the school of firing must have a special corps of troops. The victorious War of 1866 had put an end to the situation without budget and the Chamber of Deputies again made ap-

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propriations. The funds necessary for the creation of a school were given. My preceding letters have shown you that the accuracy with which our artillery now knows how to fire has resulted from the creation of this school which was the personal work of Hindersin. The results obtained in 1870 were brilliant.

After the school had been in operation some time, as I have also mentioned heretofore, the system elaborated in its course, a system based upon clearly defined rules, was introduced throughout the artillery. A certain time had been necessary in which to formulate a definite system, for at the outset an incredible number of propositions and projects had been brought forward, and many mistakes were made before reaching correct decisions.

While requiring firmly that the system finally decided upon should not only be mathematically correct but also simple and easy to comprehend, as it must be if it is to render all the service that is required of it at the moment of danger, Hindersin nevertheless accorded to the school a certain latitude in regard to experiments and allowed it to proceed with them until convinced of their inutility. By following this course, by controlling the precipitation which was natural to him, he gave a strong proof of his good sense, for before actual trial it was impossible to know which of the systems would be found best.

In order to qualify himself for forming a correct judgment, as to the several systems, he passed all the spare time left him from the performance of his other duties at the school of firing. He was seen whole days there, on the practice ground, or in the halls of the school, present at the deliberations, at the regular course, and at the criticisms, always a mute auditor. He disturbed no one, gave no advice, but each day carried a new idea away with him.

After this manner he left full liberty of action to the school for a certain time.

I have already said that only since 1868 has the instruction in firing corresponded to the special construction of the rifled pieces. I ask your attention here simply to the wisdom displayed by Hindersin in leaving the school of firing this time in which to develop, before actually proceeding to modify the rules for practice-firing. By this course he not only formed a certain number of instructors for each regiment but awakened also in the entire corps a general belief in the necessity for a modification of the ancient system. He therefore had to do not only with men ready to obey him but even with men who were in advance of his desires. This went so far that when, at the beginning of the year 1868, the general invited the school of firing and the artillery brigades to submit to him propositions concerning the new mode of proceeding with the firing excercises, these also sent him propositions on the same subject. The propositions and the invitation of the inspector-general crossed each other on the way.

From this time the general required with the most rigorous severity that the batteries should obtain the best possible results at their practice. In his eyes those troops were the best instructed who, being equipped strictly in accordance with the regulations and observing carefully all rules prescribed for the march, traversed great distances most rapidly in order

to arrive upon the supposed field of battle; and those who, in observing the regulations strictly, entered the line of fire and obtained the best results with their firing. Those artillery officers who were not in service during this transition period can hardly do justice to the merits of Hindersin and to his great services. To-day there is scarcely a captain or senior officer who has not followed the course at the school of firing many times and it is difficult to form an idea of the former condition of the arm; of the pedantic, worn-out, stupid method which it was necessary to overturn in adopting a practical and rational system.

You can easily see that this could not be brought about without causing this or that officer to suffer from the somewhat brutal proceedings of the inspector. It is wholly natural that a man so brusque as he was, of a character so suspicious, should antagonize many. It is equally natural that sometimes he wronged one and thought too highly of another. Therefore the troops did not love him; they feared him. But he did not care to be loved. He wished simply to follow while he lived and to bring to a good ending the work which he had made the object of his life.

Hindersin attached great importance to Kriegspiel. He caused it to be taught systematically to the students at the school of firing, and afterward made it a part of the regular service of the corps. The play of war is, it is true, but a game. It is always more or less removed from the reality according as he who directs it has more or less practical sense and has had experience in war. But the game certainly teaches one to appreciate the ground, to take its features into account, to read maps, and to study the parts played by the different arms as related to each other.

Artillery officers in the practice of this game have to make the proper use of all the arms, and in that way are taught with the greatest clearness the part that the artillery should take as a part of the whole army. Little by little, without the need of specially stating the fact, they came to see that the artillery could never be other than an auxiliary arm; that the essential condition of its action is based upon its being a part of the grand total of the army. In this way the play of war contributed essentially to extend the circle of ideas of the artillerists and caused the former narrow view of their duties to disappear from among them, in fact, annihilated the old spirit of caste.

Hindersin drew profit from all the new ideas of his subordinates bearing upon improvements in the Service. One autumn, at the time when the manœuvres were ended and the men of the reserve dismissed, so that the batteries could not, being without a sufficient number of men, practice mounted drill, he saw a group of officers and non-commissioned officers riding across the fields. He found that they were examining the ground to seek positions for a supposed plan of combat and to discuss the mode of action proper to adopt in such positions. He immediately elaborated a scheme for making these excursions with a view to making reconnoissances. They became later a branch of the Service.

Since I am treating here only of field artillery I can speak but in an incidental way of the action of Hindersin in the domain of fortress artillery.

It is sufficient that you consider but the single fact that it is he who

created the independent regiments of heavy artillery with battalions of garrison artillery, which, until that time had been merely appendages of the artillery brigades and not in much repute. He transformed the character of these troops entirely. Up to that time they had known no other mission, no other end, but to exercise daily upon the bastion, the same steps, the same service of the piece which never changed place. Daily they fired upon the same target, and it was not permitted them to become acquainted with any other part of the fortress which they garrisoned, but that assigned them for their exercises.

Consider the fact that Hindersin caused these troops to simulate siege operations and operations for the defense in the environs of the place, and if you then think it worth while to pass in review all that this change means you will have some idea of the magnitude of the service he rendered and of the amount of credit due him for bringing it about.

It was in 1869 that, upon the motion of Hindersin, the first extensive siege and defense exercises took place. At that time these manœuvres were scarcely fully sketched out; they were in some sort just coming into existence. Now they form a whole system. In no regiment of heavy artillery is the annual course of instruction thought to be complete until the exercises appertaining to the siege and defense of the place have crowned it. And before Hindersin the thing was entirely ignored. It is he who first felt the need of these exercises, he who created them.

Consider also the following facts:

It is just at this time that the work of replacing all the old smooth-bore pieces, except those to be kept for flank defense, was commenced. The material to be changed was enormous. This material, for no other reason than that it was there, by its enormous mass offered a resistance very difficult to overcome.

At the same period were transformed all the artillery regulations without exception, as well those of the garrison as of the field artillery.

Hindersin controlled each word, each syllable. He caused the rules they contained to be put into actual practice before approving them.

Thus you may obtain some idea of the consuming activity which this man displayed in the course of the seven or eight years in which he was at the head of the artillery.

"No one is happy before death," said one of the Grecian sages. Hindersin is dead and now it is permitted to say of him that he was one of the mortals most fortunate. His life, the influence that he exercised, the work he undertook, his end, are worthy of envy. He had no other thought, no other occupation, than the improvement of the artillery. In the War of 1870–71 this artillery, brought to perfection by him, was put to the proof. It stood it with full success. The services it rendered were so numerous and so great that the renown of them was world-wide, and it achieved an enviable place among the other arms. Hindersin could say with a sentiment of profound satisfaction that this success was his work.

It was given him to see the fruits of his labors and when the year 1871, the year of the victory, came to an end, he went to his rest, that is to say, he died.

He had the presentiment, that he would die of disease of the heart. He did not deceive himself. One day in taking leave of one who had passed the evening with him he said: "The next time you enter my door it will be to assist at my funeral." His prediction was realized. Eight days later we bore him to his last resting place.

He died on the 23d day of January, 1872.

LETTERS ON INFANTRY.

By PRINCE KRAFT ZU HOHENLOHE INGELFINGEN.

Translated by Lieut. Odon Gurovits, 11th U. S. Infantry.

IX.

THE INSPECTION OF A BATTALION.

YOU are wrong to reproach me because I find so much to object to in our method of leading the battalion and so little in that of leading the company; and I am still more opposed to your forming the opinion that by so doing I encourage the presumption of the junior and subaltern officers towards their battalion commanders. You very properly refer to the fact that the battalion commanders at some former time were company officers. Therefore if I find fault with the usual instruction of the battalion, it is not intended as a reflection on the individual battalion commander. Neither can it tend to lessen their authority over juniors, as the battalion commanders must be at least as well informed and efficient as their juniors are; otherwise they would never have been promoted to be battalion commanders, nor would they ever have continued as captains. To this add also longer experience.

When I refer to these very common mistakes, it is only to call attention to the fact that it is far more difficult to prepare a battalion for field service than a company.

It is true the latter requires more time, application, and diligence, still the former is in itself more difficult, if at all possible, of being entirely mastered in the available time. In order to instruct a company and make it efficient, the requirements are: good judgment, knowledge of the duties of a captain, honor, diligence, and conscientious and faithful performance of duty. These are, however, not sufficient for the battalion commander. There is a certain amount of talent or natural aptness also necessary. He must divide judiciously the available time and make the best use of it.

We have therefore to inquire whether there exist any means by which we can remove the evils mentioned.

The many attempts to counteract these evils prove that others were also aware of their existence although they never obtained official recognition.

The old method of executing at battalion drill nothing but elementary tactical movements in their most rigid form, viz.: to restrict instruction to changes of front, manual of arms, formation of columns, wheelings, deploy-

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ments, marching to the front or obliquely, with a very limited skirmish drill and the latter only when the entire battalion was formed, and, finally, to lay the most importance to a well-executed stiff parade march—this has all been abandoned by us as early as the middle of this century. The battalion commander was permitted, after presenting the battalion at the close of their drill, to execute movements of their own conception without regard to the regulations.

This gave the field officers something to ponder over and much that was new and good grew out of it. When a battalion commander presented an entirely new idea, he was considered at least original although his idea was not always regarded as a practical one.

But this very soon led to excesses.

Each one wanted to discover something new and kept his discovery a profound secret until the inspection disclosed it; after which he again would rack his brains for the next year so as to be able to show something absolutely new at the next yearly inspection. One then could see the most absurd ideas, amongst which the chronic "river," outlined by a few men and sometimes placed in the middle of the drill ground and sometimes at the brow of a hill, was the least amazing, etc. Owing to the disorder which was one of the characteristics of such experiments these movements were named "Turkish manœuvres" or, shortly, "Turks." The result of this allowing every battalion commander to show his "Turk" in the presence of his superiors, was to affect very seriously the authority of the regulations; and every one believed that thereafter, in action, the regulations would be disregarded and violated more than ever. The precision of tactical movements was attacked and naturally the discipline suffered much therefrom.

The exclamation of a noted old drill-master which had its origin from that time, viz.: "The parade march, gentlemen, is like the art of glass painting, an art which has been lost," refers to this evil in a somewhat original manner.

In the course of a few years the best authorities commenced to work against the tendency to such irregularities, and insisted that on the occasion of such "Turks" only movements that appear in the regulations should be executed.

The use of the company column in connection with fighting formation in dispersed order was gradually brought into vogue by modifying clauses of the original regulations.

After the experience of the campaigns of 1870–71 it was again permitted to practically illustrate new ideas on the drill ground. The main problem now to be solved was how to advance to the attack over ground within the effective fire of an enemy. The most wonderful methods were shown—sometimes a square of 300 steps on a side of the drill ground seemed to be strewn with files of two men each; immediately the thought struck the observer that the entire field represented a systematic panic. Again the battalions were seen to run until the men were completely exhausted, the men then fell down and fired in such a state of excitement that would cause any one to doubt whether even a single shot fired would hit or not; or, skirmishers were seen running in swarms, firing while at a run, the piece held at the

hip horizontally without aim. An unlimited literature full of propositions confused the heads of the studious officers, who finally did not know what was written in the regulations or what they had read in military pamphlets.

The new edition of regulations, dated March 1, 1876, put an end to this unsettled condition of affairs. The 4th and 5th parts of these regulations are sufficient for all the requirements of war and permit, as already remarked once before, to lead the infantry anywhere in such a manner as the ground and the stage of the fight demands on account of their great elasticity and flexibility.

How, then, can one avoid, after any prolonged period of peace, returning to rigidity and placing the main stress of instruction upon the paragraphs of the 3d part?

I shall now speak of the day of inspection, since our men will be instructed and drilled according to the manner in which they are to be inspected. We have just reason to be pleased that the discipline of our army is yet such as to accomplish these results. The inspection of a battalion is generally so conducted that, after a formation for parade and parade march, a part of the time is devoted to the 3d and 4th parts of the regulations. The inspecting superior usually designates what he desires to see of the 3d part and then leaves it to the battalion commander to represent an engagement according to the 4th part, unless the inspecting superior prefers to leave both entirely to the judgment of the battalion commander. As a consequence, in the 2d part of the inspection, usually called fighting drill, a battalion commander must endeavor to show how he thinks a battalion would appear in action at greatest advantage. Therefore he insists that not a single skirmisher walks or acts differently from what he thinks to be right. Naturally, then, his fighting drill (his "modified Turk") is beforehand carefully divided into phases well discussed with his officers, and he will endeavor to prevent the least deviation from his prearranged plan, because a deviation would injure his tableaux.

Because of this pre-arrangement of every phase of the intended manœuvre the drill results in a theatre show. These show drills become more like reality—the less the battalion commander knows of what condition is going to make its appearance next. The desire on the part of the battalion commander to prevent all possible departures from his plan at the battalion drill forces the battalion commander to move around frequently where he never could be in action.

All this has the effect of destroying the prompt decision and action of the sub-leaders and it is therefore to be avoided, notwithstanding that it has something in its favor, viz.: it reveals to the battalion how the commander wishes it to move in battle and for the same reason he is anxious not to subject himself to unfavorable criticism. Add to this, that such drills in fighting tactics, when left entirely to the battalion commander, very often lead to impossible conditions which, when we consider the limited power of locomotion of the infantry, would frequently lead to an unwarranted consumption of time and physical force of the men. This has more especial reference to the naturally strong desire to lay particular stress on the results of attacks on the flanks. Thus, should a battalion commander desire to

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demonstrate the issue of a flank attack made by a company previously designated, he must take the necessary precaution when about 2000 meters from the object, since the movement would be an impossible one if made while exposed to the fire of the enemy; further the drill ground must offer the required space. The consequence of this is, that, at least half an hour more time is required on account of the greater distance gone over and also more time is consumed in covering a certain distance where the advancing is made by "rushes" while exposed to the fire of the enemy.

Such illustrations of a flank attack are very seldom successful—either it arrives too late, after the main frontal attack has taken place, or too soon.

In both cases one of the two, the frontal attacking party or the flank attacking party, must remain stationary for a certain time exposed to the enemy's fire to such an extent that it would certainly result in defeat. This is evident since the infantry cannot, like the cavalry, take the next increased gait and so avoid the risks due to faulty calculations of time. Only one form of attack combined with a flank attack can be demonstrated at drill without loss of time and it has been sometimes ordered by one of our general officers. He at the start ordered the skirmishers of the company designated to execute the flanking movement, to take position at right angles in the skirmish line of the frontal attack and then ordered the advance against the enemy. Thus the skirmishers of the flanking company advanced in column of files against the enemy on the exterior side next to the company column. I cannot imagine how that officer could ever conceive of an enemy who would tolerate such an attack, especially as I had the opportunity of witnessing him attack enemies who did not manifest such an amount of good nature.

It is true I violate the principle: "*De mortuis nil nisi bene*," by calling your attention to this, but I wish to furnish you an example of how far the gift of discovery sometimes forgets, as even to forget Clausewitz's quotation already once mentioned, viz.: "In war everything is simple, but the simple is difficult."

As soon as I became commander of a division I at once endeavored to abolish within my sphere the evils mentioned by inspecting the battalions accordingly. After several trials, which failed on account of the battalion commanders going too far in their zeal, I adopted a method which proved itself an efficient one during years of practical experience. It proved also that our battalion commanders were very able and efficient in instructing their battalions and that only the manner of inspecting up to that time caused them not to instruct more properly. As soon as my ideas were fully understood I had the pleasure of seeing them improved upon by these gentlemen. Of course this was natural and due mainly to the fact that they had served longer with the infantry arm and had experienced more in detail either as captains or as general staff officers.

Then I commenced to learn from my inferiors.

I shall now describe to you the method of making my battalion inspection because I consider it the proper solution of the problem. You may adopt it if you choose, or disapprove of it.

I now shall give you the results of my experience. I commenced my

battalion inspection like any other inspection, with a formation for parade and next a parade march. I attach great importance to this, since when forming for parade one can judge, by observing the bearing of the men, of setting up drill; when executing the parade march, by observing the manner the feet are planted and whether there is any crowding in the ranks, one can judge whether the method and attention to details in instruction have been good or not. A comparison of my observations, when inspecting recruits or companies and when reviewing a parade march, led me to this conclusion. Furthermore, nothing is more indicative as to the treatment the men receive from their officers than the expression of their faces when forming for parade.

Such observations might give a wrong impression, depending upon the time the men were unnecessarily kept waiting in line at attention. In order to prevent such a possibility I always ordered the battalions to stack arms and break ranks, and not to form line until after my arrival. By so doing I could also observe promptness in falling in. It took a little more time, but it reserved the physical strength of the men for the fighting movements.

I will remark further, that after each battalion inspection, I ordered a parade march in some different formation. This I regarded as a reward for the men, and a solemn close of the inspection; I at the same time addressed a few encouraging words to the men.

I never omitted such a reward unless the inspection had been entirely unsatisfactory. Such, however, never was the case, as I at least always found good will and intentions.

The parade in line and marching past in review is also a good opportunity to judge whether the regulations are regarded as supreme authority or not.

After the first parade march I allowed each battalion commander ½ to ¾ hour's time to show the movements of the 3d part of our drill regulations, excepting the 16th chapter, which I reserved for myself until I, through the fighting drill, succeeded in mixing up the battalion and companies as much as possible. In ¾ hour's time one could ascertain if the movements executed by command of the battalion commander are thoroughly imbued into the minds of the men. After a short rest I proceeded to the fighting tactics.

I introduced this by indicating an enemy by a few markers and then giving very elementary problems to the battalion commander. In solving these, however, I allowed none but commands and movements prescribed in the regulations, nor did I allow any one to forget that the movements are to be executed in presence of an enemy.

The captains did not receive any more instructions than was necessary to understand suppositions as to enemy and markers and which would always be obtainable in an engagement. The battalion commander had to remain in his proper place. Should part of the forces be engaged to such an extent that it would in war be impossible to withdraw them, the battalion commander had to accept it as an accomplished fact, and was compelled to make his dispositions accordingly. The manner of firing (volley fire, elevation, fire with two or more sights, number of cartridges to be fired, pauses in firing, individual fire, rapid fire, etc.) and formation (whether swarms, line, column

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and which columns) were the subleaders' business, who only were held responsible for their actions, also when to lie down or when to take up double time, etc. All this gave opportunities to give valuable instruction. By reserving to myself the determination of problems I had it in my power to prevent impossible combinations on the drill ground. I also could prevent too much waste of time in executing any single fighting movement which threatened to become too long in the execution. I could then shorten the time required by introducing a new factor into my problem (a cavalry attack or to assume the defensive from the offensive). By constant practice I succeeded in having a battalion solve 3 to 4 problems in ¼ of an hour to 1 hour, provided I carefully prepared my problems beforehand. Should the garrison consist of 3 to 5 battalions, I was then enabled to demonstrate in practice before the same field officers and captains from 12 to 20 different examples, and thus touched upon almost every subject of the 4th part.

To make it more plausible I shall give you a number of such problems for example:

1. An isolated battalion attacks an object in front (frequently to save time only the first 500 metres of the attack were executed, sometimes the last 500).

2. An isolated battalion defends a position (intrenchment, redoubt, wood).

3. A battalion acting as advanced guard unexpectedly comes upon the enemy; or

4. Is surprised by the enemy.

5. The battalion is sent to attack an enemy on the flank and succeeds in gaining the flank unobserved in fighting formation until at 300 metres.

6. The battalion is in the centre or on a wing in the first or second line of a brigade acting on the offensive.

7. Acting as the last reserve in the centre, the battalion is directed to make an attack, *coûte qui coûte*, to insure success when the decisive moment has been reached and then to spur the fighting line into a general charge.

8. Reinforcements to the enemy or an attack on our own flank force the offensive to change to the defensive, or to a retreat and the reverse.

These eight cases permit of more than twenty combinations and these likewise offer many variations, depending upon the drill ground.

The suppositions of an attack of the hostile or of our own cavalry, or that the battalion commander was placed *hors de combat*, present a still larger field of variations. The last condition mentioned, I invariably introduced into the problem when a battalion commander placed himself at the wrong moment within the effective range of the hostile fire, or when the senior captain of the regiment was present and I desired to give him the opportunity of showing that he could handle a battalion with efficiency. In this manner the inspection of a battalion lasted on drill about 2½ hours and it was as much as I could ever accomplish to inspect two battalions a day. If more is attempted it will be impossible for one to pay the proper attention to details. As the twelve battalions of my divisions were stationed: 5 in one garrison, 3 in another, 2 in another, and the remaining 2 in two other garrisons, I was enabled to inspect inside of nine days (one Sunday intervened) all the battalions. To go more into details at inspections was only

possible by shortening the time available for instruction to make available more time than required for the inspection. The afternoons were always taken up by travelling, also by inspecting internal administration and discipline.

One might think it strange that the division commanders did not all inspect in this manner, knowing the same to be efficient. This is, however, caused by the desire to manœuvre the battalions and inspect them in a manner to carry out the views of the commanding general. The officer at the head of an army corps, must necessarily devote less time to each battalion, and therefore he has to leave it to its immediate commander to show its efficiency.

Had what I have described to you been generally known, had all the division commanders inspected in that manner then, with the interest of the Service at heart, I would have just reason to be pleased. I have often heard the opinion expressed that our system of terminating our drill period with an inspection is very objectionable and many pamphlets held this same view. The reason given is that one cannot in a single day or hour of inspection judge a leader and his men justly, and that the fate of a particular leader depends very greatly on that one fortunate or unfortunate day. As a substitute, the system of the French camps of instruction is proposed; here the daily routine of the superiors (as long as the practice season lasts) is such as to keep the junior officers under constant observation. This argument is entirely wrong; because the final decision as to the efficiency of an officer is not formed from that one day of inspection.

There are many opportunities throughout the entire year to observe any officer commanded or commanding, such as the regimental and brigade drills and also the field manœuvres, etc. An officer's method of performing duty can be learned by looking over the record of punishments awarded; here we see his idea of discipline as well as his decisions and actions at times of sudden emergencies; furthermore, a commander who feels confident of himself and his men, is not dependent upon the fortune or misfortune of the inspection day.

The final estimate of an officer is not arrived at in a single year; thus he has opportunities of counteracting any unfavorable impression which he might have made through accident. Should an officer in a camp of instruction, however, be aware of the fact that he was constantly observed, even when superintending the simplest exercises, expecting constant check and criticism, he would never acquire those necessary qualities of promptness and self-reliance.

"No master drops from heaven," everybody commits mistakes at the start. Were it not possible for an officer ever to make a mistake unless he were called to account for it by a superior we could never expect our officers to assume responsibility when the occasion demands. Not to mention other disadvantages, even in this respect, the camps of instruction according to the French system are not preferable to our method of inspecting detachment exercises and manœuvres.

The method suggested by me is perfectly sufficient to enable one to form a proper estimate as to the efficiency of any commander, and it will also

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force him to prepare his troops in the manner described, knowing that he will be inspected accordingly. Therefore he will allow to all sub-leaders independence of action and avoid interfering too soon in minor matters, which is out of the question in war and which arises from a natural temptation to personally superintend instruction in the first principles. It requires, however, that the inspecting officer have a certain consideration for the feelings of the inspected, and that he proceed accordingly. Frequently the inspected officer is in a very excited and nervous frame of mind on account of not knowing what movements he may be required to execute, the feeling of being examined, and also on account of the influence that the inspection may have on his future career and reputation. All this is liable to produce with many officers an extreme state of nervousness and uncertainty, both of which bewilder his conception of the military conditions. It is therefore necessary to remove this embarrassment before a judgment as to efficiency is rendered. A jocular expression is the best remedy. I recall the case of a field officer who was generally very self-reliant and efficient, but who, at the beginning of an inspection, became so embarrassed that he gave with trembling voice the first simple commands incorrectly for the parade march.

I rode up to him and whispered to him: "Major, I noticed your battalion at drill repeatedly, it drilled with such perfection that I would, if in your place, not allow myself to again become embarrassed." He looked at me in astonishment, smiled, and from that moment the battalion drilled without a mistake.

LE COMBAT D'ARTILLERIE DANS LA GUERRE DE SIEGE, D'APRES LES THEORIES DU GENERAL WIEBE.*

THE German general Von Wiebe, formerly Inspector of Fortress Artillery, has written a pamphlet in which he tries to define the rôle of artillery in the siege of the future. It treats only of the regular siege *à la Vauban*, which methodical operation has lately been condemned by General Von Sauer, who thinks that the only rational way to besiege a fortress is by abrupt [*brusquée*] assault.

Von Wiebe laying down as an axiom that the artillery combat will certainly, in nearly every case, decide the result of the siege, endeavors to solve the question of what pieces are required for the attack and defense of a fortress, where, when, and how to use them.

Modern artillery will give to the modern siege a special character. The heavy guns which are made nowadays are as indispensable for the attack as for the defense of a fortress organized on rational principles, and by their power and facility of working they will play a more important part than they have done in the past.

The principles of the art, however, are the same as in the time of Vauban,

* From the Royal Engineer Journal of March 1st, 1890; being a review of an article in Revue Militaire de l'Etranger, December 30, 1888.

and the steps are the same. Investment is first necessary, next the besiegers' artillery on the selected front of attack reduces to silence the opposing guns, so that the work of pushing forward to the assault can be seriously proceeded with.

As on the invention of rifled guns critics apprehended the upset of the equilibrium between attack and defense, so now the *obus torpilles* cause the same cry to be raised, and we hear that it is impossible for a fortress to hold out for any protracted time before these engines of destruction. However, if the like means are in the hands of both besiegers and besieged the relative position of the two parties appears to remain the same as before.

General Brialmont supports Von Wiebe in this view, and says: "One truth which the new school [Von Sauer's] does not take into account is that the fundamental principles of fortification are as invariable as those of strategy, and the progress and armament and tactics only exercises influence in the manner in which these principles are applied.

Such, however, is not the opinion of Von Sauer. He thinks that the new projectiles have so turned the tables on the defenses that the besiegers need no longer go into the delays of a regular siege, for the fortress offers such a favorable field for the development of the full destructive power of modern artillery that the sieges will in future be counted by weeks where months would have been occupied formerly.

Such are the opposing opinions of the time. For ourselves we may be careful to bear in mind that France naturally inclines to the opinion that elaborate fortresses are not to be taken by Von Sauer's rapid manner of attack, for if they were, alas for the £135,000,000 they have spent on their eastern frontier during the last fifteen years, and for the money which is still being provided by yearly credits of immense sums.

Von Wiebe lays down that iron armor in the form of cupolas is necessary in fortresses under the following conditions:

1. In important forts completely isolated, or far from the main defenses, and in which it is necessary to enable a small garrison to resist an enveloping attack.

2. In portions of a fortress where few guns can be mounted, or which are important to stop the advance of the enemy, or prevent him occupying a commanding position. Such are those which block the important lines of communication, which have a good field of fire, or which are near probable points of attack and can take in flank the besieging batteries.

3. To protect flanking pieces which are to be used only at the last stage of the attack, *i.e.*, from the end of the artillery combat to the assault of the breach.

General Brialmont goes further than Von Wiebe in advocating the equipment of iron armor, condemns absolutely the sole use of uncovered guns, and recommends a large use of cupolas for both direct and indirect fire.

It is, however, clear that as armored guns are more costly than unarmored guns, but few of the former could be employed in the place of a larger number of the latter, and thus some risk would be run of losing the artillery combat prematurely by a deficient artillery power, for though guns in cupolas may be expected to have a longer life than guns without armor

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to protect them, yet who can say in this age of invention that more powerful explosives than those now used will not shortly nullify the protection given by armor as at present applied. Besides, armor complicates the mechanism of a gun and thus renders a chance putting out of action more probable in the case of an armored than unarmored gun, and in such case irreparable damage may be done to a defender placing much reliance in a few armored points.

We must remember that the days of armor have given way to days of mobility for the fighting men on the battle-field, and the same is happening to our modern war ships; it therefore behooves us to pause before hiding the greater part of the artillery of our fortresses behind armor.

General Von Wiebe divides the rôle of artillery in a siege as follows: *To breach, to demolish, to bombard.*

To *breach* is to open a road for the assaulting columns, *i. e.*, to silence the artillery of the defense and destroy the auxiliaries of the defense, such as obstacles, shelters, etc. The defender resists this by endeavoring by his artillery to prevent the enemy developing his force.

Artillery then fights the battle.

This rôle to breach may be divided into three portions:

1. Operations which precede the artillery combat-period of preparation.
2. The combat itself-period of execution.
3. End of siege-period of completion.

In the period of preparation the artillery assists the field troops to push back the defender from his advanced points. In the period of execution the artillery endeavors to silence the defender's guns and assist the advance of the siege corps by destroying obstacles, shelters, opening trenches, etc. In the period of completion the attack is driven forward and the defense works destroyed, and if there are further defenses in rear intact, the besieger recommences his operations for their reduction.

At the conclusion of this review, which is to be continued in the next number, we append the following paragraph from General Brialmont's book, *Influence du tir Plongeant et des obus Torpilles sur la Fortification, 1886.*

"General Von Sauer's method of attack will be upheld by that numerous body of soldiers who, prizing the offensive beyond all measure, deny that a fortress can stop the march of an army resolute to vanquish all obstacles. This misconception of fortification, arising from an excess of confidence in the means of attack, may conduce to the most sorry results. It is the duty of engineers, more correctly informed of the difficulties that the attack of a fortress offers, to put their generals on their guard against the application of theories which do not take sufficient account of the value of the lives and the blood of their soldiers.

"The time has gone when bodies of troops could be precipitated into a ditch to form a passage way for assaulting columns. No nation, however great its power and military superiority, is justified in thinking that the offensive will always succeed, and that it will never have to sustain a defensive war with the aid of fortified positions."

Military Notes.

NEW GERMAN CAVALRY TACTICS.

IN no arm of the German Service has the improvement been more marked in the last twenty years than in their cavalry. Not only have the ideas regulating their tactical employment broadened out in the most remarkable manner, but the riding of both men and officers, and the improvement in the horses themselves, is so astonishing that German officers who remember the days before 1870 are compelled to confess that the results have exceeded their most sanguine expectations. In 1870, the idea that cavalry could not charge infantry was even with the cavalry themselves an axiom which no one questioned. When on August 16th, at Mars-la-Tour, the First Garde Dragoner, now Queen Victoria's Regiment, were called on to charge, their colonel, who proved his courage amply in the attack which they delivered, objected that to charge infantry under the conditions of the moment meant absolute destruction; and only a few hours before, Bredow, when similarly called on to charge against guns and infantry, replied to the officer who bore the request—for the first summons was a request only, as it came from the officer commanding the 6th Division, and the cavalry was not under his control—that "cavalry cannot charge unshaken infantry." In both cases the result proved they could. In the first charge the dragoons only lost one-third of their number, and Bredow's brigade, the 7th Cuirassiers and 16th Uhlans, about one-half of theirs. With the results of these two charges before them the reformers, foremost amongst whom were Prince Frederic Charles, General Schmidt, and Colonel Kaehler, set to work to upset the axiom, and at the same time to convince the whole army that with the changed conditions cavalry had not only lost but gained in importance as factors in the conduct of a campaign. They showed that not only had their own cavalry brilliantly covered the strategic advance of their armies, but that the enemy in the next war would try to do the same. Basing their argument on the nature of the man, and not on his weapon, they proved that the opportunities of cavalry on the battle-field against shaken infantry would be as great and decisive in the future as they had been in the past: only to seize them cavalry must learn to gallop and manœuvre, and must not stop to question too closely whether the enemy actually are shaken or not, experience having demonstrated that infantry are already deeply shaken morally before they show signs of their condition, visible at the great distances of modern encounters. We have no space here to follow in detail the steps taken to develop the latent power of the arm; but the following account of a regimental and brigade inspection sent us by a correspondent

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who has enjoyed exceptional opportunities of seeing the German army at work will show the perfection to which they have arrived. Our correspondent's letter is interesting when read in connection with that of Captain Gall:—"The first thing that struck me on riding down to the ground was the extraordinary precision with which the alignment was taken up—every horse dead square to the front; and when the line was called to attention, every man took up his reins, collected his horse, and sat ready to obey the word of command. This is an important feature, for it is on this that the extraordinary precision with which a manœuvre is commenced depends. Again and again, on subsequent occasions, I saw a whole brigade move off at a trot simultaneously—literally, before the eye could sweep from end to end of the formation. Of the march-past at a walk with which the proceedings commenced, I need only notice that it was neither better nor worse than what we usually see; but the small horses looked altogether overweighted by their riders, and the want of smartness in the turn-out also unfavorably impressed us. But all this was changed when they began to move. After the march past the regiment was drawn up in line of squadron column at close interval. The 'trot' was sounded, and they moved off with absolute precision, and after advancing a couple of hundred yards they opened out by inclining to full intervals. Then they wheeled into half-column of squadrons, and continued the advance in perfect order for about 400 yards, still trotting. Then followed 'front form' and line to the front on the leading squadron, to effect which the rearmost squadron had a considerable gallop. A few more yards to the front to steady them down, and then they broke into column of divisions (*Züge*) to the left, and immediately afterwards the 'gallop' sounded, and away they went at their full gallop of manœuvre of fifteen miles an hour without the slightest opening out: this pace was maintained for about 1200 yards, then the head of the column wheeled to the right, and as soon as the tail of the column passed the wheeling-point, the 'wheel into line' sounded, and the movement was executed with an accuracy I could hardly believe possible. The advance was continued some three hundred yards, and then the 'charge' sounded, and it was delivered almost like a wall; then *mêlée* and rally followed, and the regiment drew up in its original formation of line of squadron columns at close interval. I subsequently measured up the distance covered at the gallop on a large scale-map, and could not make it less than 3000 yards, take it any way I would. The next operation was the debouching from a wood and charging infantry. The regiment, which, I should have mentioned, numbered five squadrons of sixty-two to sixty-five files, trotted off down one of the numerous cuts through the forest which borders the drill-ground, and when all had well disappeared, we heard the 'halt' and 'threes about'—the Germans still work by threes and not by fours—and the next moment the 'gallop' sounded. The regiment came out, not at the gallop, but at the charge: each squadron front formed as it got room, and selecting its own object about 600 yards from the wood, charged down on it at the fullest extended speed of their horses; and then all idea of the little horses being overweighted vanished from my mind. They came on like the fastest rush on a polo-ground, though of course the lines were not so well

closed up as before. I had to confess, infantryman as I am, that even repeaters would have had a poor chance of stopping the rush. Then followed a short halt without dismounting, and then three more long advances, ending with charge and *mêlée* and pursuit, were ridden. None of the advances were less than 2000 yards, and in two out of the three the line was formed after the 'gallop' had been sounded, and not whilst the heads of the columns were still trotting. The charges were beautifully ridden, boot to boot throughout. In only one point could I find an opening for criticism—viz., that the *mêlées* were hardly satisfactory, the men scarcely leaving the ranks, but only making a pretence of doing so. Probably, as it was only an infantry general inspecting them, they thought it safe to try a little 'eye-wash.'

"I must confess, however, that under no circumstances have I ever seen this part of the show as well done in Germany as I used to see the 11th Bengal Lancers do it in India. The day wound up with a gallop-past, for which I have nothing but praise. The squadrons swept by at their full fifteen miles an hour, horses in hand, and that smooth, rhythmical swing of the plumes (they wore plumes that day) which implies a total absence of wasted energy. One might live long at Aldershot and see nothing better. Next day I went down to see the brigade inspection. The brigade turned out two regiments of five squadrons each, the squadrons the same strength as the day before. After the march-past the manœuvring commenced, as the third line of a division in line of squadrons, at close interval, at a trot; and it would be difficult to imagine anything more perfect than the way they changed front and wheeled. There was no trace of raggedness anywhere; they looked just like two squares off a chess-board manœuvring about. Then came a repetition of the gallop to a flank in column of divisions (*Züge*) of the day before. For about 1500 yards this tremendous column, nearly half a mile long, moved with the same precision as the regiment had done. Then they simultaneously wheeled into half-column to the left. Just at this moment, the head of an infantry column emerged from the wood to the right rear, and the general commanding took them for his target. He sounded 'troops about,' which brought them into half-column, right in front, and his gallopers flew. As the leading one reached the right-hand regiment, I heard 'line to the front' sound, and the regiment formed to the front, not at the gallop of manœuvre, but at racing pace, and went straight for the enemy. The three squadrons on the right of the second regiment completed their wheel, which brought them into column, and enabled them to gain the rear of the first regiment, when they again wheeled into line and charged right into the *mêlée* of the first line, and the last two squadrons cantered up and halted as last reserve. I have never seen anything faster or more perfect than the way this attack was delivered. The infantry, of course, had nothing to do with the performance, but were only coming out to drill, and therefore took no notice of the cavalry; but still, had it been an ordinary defile, the cavalry were down on them before 300 men had passed, and under such circumstances that even repeaters could not have given them more than an average of five shots, or 1500 bullets, of which probably not fifteen would have taken serious effect. What would

have become of the infantry then? It is a question which I, as an infantryman, must ask. The remainder of the inspection consisted of two more long advances and charges against a skeleton cavalry, all delivered with the same precision as the day before, and after a critique and final gallop-past we all marched home together, the squadron leaders congratulating each other on having had two such easy days for their horses. And indeed, in comparison to the previous fortnight, they *had* been easy days, for they had had five days a week of from five to six hours a day, and on these two days the last squadron was back in barracks in three and a half hours only. It is difficult to estimate the ground actually covered, but to the drill-ground and back was eight miles, and in the hour and a half's manœuvring they had covered at least twelve more, or twenty in all. During the preceding period they could never have done less than thirty miles, all told. Yet in spite of this the horses were in perfect condition, far superior to what I remember them at similar periods five and six years ago. Going round their stables afterwards, I was simply astounded at the condition of the animals' legs and sinews. Not a sign of overwork was there amongst them, the sick lines being nearly empty. Afterwards, in conversation with the officers who remembered the old pre-'70 days, I was assured that the improvement in the remounts and the way of managing horses had been so marked, that whereas formerly it was difficult to make up one's mind as to which of the horses ought to be cast, because they were all so miserable, nowadays it was difficult to find enough to cast, so few really being literally past work. I could not help thinking that the fact that nowadays they generally drill in field-day order, instead of as formerly in full marching order, probably had a good deal to do with the matter."—*Army and Navy Gazette.*

USE OF CAVALRY ON THE BATTLE FIELD.

In Germany a reaction has set in with regard to the tactical use of cavalry on the field of battle. Some are of opinion that in these days of extended formations the self-reliance of infantry will be shaken in the presence of an overwhelming body of cavalry. The theory of this latest freak appears to be that the loose order of modern infantry formations affords even greater opportunities for cavalry to drive home a charge than in the days of flint-locks and shoulder-to-shoulder manœuvres. It disregards the effect of long range or even medium range fire, which now extends over a zone of 1700 yards in depth, and risks running the gauntlet through a hail of lead twenty times as thick as that which had to be faced before the introduction of breech-loading rifles and smokeless powder. It seems to ignore the greater facilities for taking cover—which in the case of an average shot ought to mean securing a good field of fire—afforded by the loose order of modern infantry tactics; also the diminution of recoil, which is a very marked feature in the new rifles which are now being generally adopted; and builds its hopes of success on the assumption that arms of precision which shoot point-blank up to 500 yards are next door to useless in the hands of the young and untried soldiers who will so largely compose the ranks of the huge armies which are now placed in the field, and that either their training or their stomach for the fight is so defective that, in the pres-

ence of what they must know to be almost certain death if they bolt, these young soldiers will suddenly become paralyzed and unable to empty their magazines at short ranges with a mass of horsemen presenting a front considerably broader than the rifle-butts, which even the very worst shots so seldom fail to ricochet into when firing at third-class ranges at a target representing a single man. But even supposing that the infantry soldiers of the period are so utterly nerveless as to be incapable of firing steadily in extended order in the presence of cavalry, the present attack formations—which no one supposes are intended to be rigidly and blindly adhered to—are all based on the sound principle that the utmost amount of effective fire can at all times be developed by the first line, which is capable at the shortest notice, say two minutes, of being closed up into a solid line two deep. It is important to bear in mind that the front of all units in attack is laid down as being equal to the first line of attack—consisting of firing line, supports and reserves—if in line, and it rests with the commander of that portion of an attacking force which is assailed to decide at any moment whether this welding together of his men is expedient. Here, then, is a shoulder-to-shoulder formation at all times provided for. It is ridiculous to suppose that a mass of cavalry about to deliver a charge over suitable charging ground will not give ample warning of its approach, and two minutes' notice is all that infantry in any stage of the attack ought to require to enable them to assume a formation in which British infantry at least have never been known to quail when opposed to cavalry; and the glorious records of El Bodon and Waterloo show that our allies when fighting alongside of us have been equally staunch and resolute. No one would advocate a return to four-deep squares, the necessity for which was never very apparent, and which, in these days, would mean annihilation by artillery fire; but between line, and two-deep square the difference is only one of frontage, and a long line is capable of developing more fire than a short one. That there is great room for improvement in respect to shooting generally, and especially to the proper adjustment of sights at medium and long ranges, will be readily conceded by all practical soldiers. This defect is capable of being remedied to an almost unlimited extent by careful training and fire discipline, and is now engaging the earnest attention of all thoughtful commanding officers. It is to be hoped that we shall not too blindly follow the Germans in this last craze. We have very properly endeavored to adopt the spirit of their infantry tactics founded upon the experience of a later campaign than that of 1870-71, and have accepted as our model their more doubtful artillery aspirations; but we have not enough cavalry, and what little we have is too valuable—I might add, too thoroughly efficient—to be played with. If called upon to charge *en masse*, our cavalry, whether British or Indian, will readily respond to their leaders; but at present their chief excellence consists in their superior horsemanship, and in the feeling that they are equal to any call that the vicissitudes of a battle-field may make upon them. The formations in which they charge must always depend on the ground and the skill of their commanders to adapt them to the object in view; to attempt to lay down fixed rules for cavalry charges would be fatal to the dash—which is, above all, the true character-

istic of a good cavalry leader. In the face of prevailing continental opinion, it will be wise to manœuvre our squadrons in columns, and it will be desirable to accustom our infantry to the noise and general appearance of a heavy body of cavalry bearing down upon them, and to impress upon them in peace-time that if they only keep steady and fire deliberately and low they have nothing to fear. Napoleon, when in the zenith of his glory, said that there were five things essential to the success of a charge of cavalry *vs.* cavalry: ground, opportunity, pace, cohesion and a reserve. Against infantry, if properly handled, he was of opinion that cavalry had no chance, and were liable to be checked by a handful of bad shots. The charges of French cavalry at Waterloo (which so signally failed) were not ordered by the Emperor. Everything went wrong under him on that day; he was physically worn out. I quote the authority of Napoleon, because the tactics of the last twenty-five years have been a *réchauffé* of his principles. It was Napoleon who said: "Le feu c'est tout; le reste c'est rien." Let us pause and consider before we adopt any tactics that Napoleon did not believe in. If infantry, evacuating a village, issuing from a wood, or debouching from a defile, omit to take ordinary precautions, they will now as formerly be liable to be surprised and overwhelmed by good cavalry. Something might be said regarding the co-operation of mounted infantry and machine guns *vs.* cavalry, but I have already encroached enough on your valuable space. I am, etc.,

H. R. GALL, Capt.

—*Army and Navy Gazette.*

"INFANTRY FIRE-TACTICS OF THE FUTURE"

Is the title of a most interesting paper which reaches us from India, by Major G. F. Young, 24th Punjab Infantry, who has been awarded the silver medal of the United Service Institution of India in a recent prize-medal competition. The essay deserves more than passing notice, more particularly as it may have escaped the attention of those serving out of India. The language is simple, and the conclusions are in most cases borne out by the teachings of experience. No doubt the author's views deserve to be considered as a welcome contribution of a matter which materially affects the fighting efficiency of the Army. Major Young remarks that nothing short of the highest steadiness and discipline will suit the conditions of future warfare, as every increase in rapidity of fire increases the strain on the soldier's nervous system, and every increase in the range of the rifle prolongs the time that strain must be borne, in addition to which every increase in "fire-power" requires an equivalent increase in "fire-control" which has to direct it. This is very true. We of all nations ought to appreciate the immense advantages of "high discipline." Major Young holds that our present form of attack is incompatible with that standard of steadiness and discipline necessitated by the changed aspect of the battle-field. Any form of attack will fail, he argues, in which "at *any* reinforcement a certain vital unit is intermixed." Further, he says emphatically that "the German system will never suit our Army." On this point there may be a diversity of opinion; but the weight of argument is, we believe, on Major Young's side. We cannot expect the German system, which is applicable

to big companies, to work equally well with our small ones. But what, it may be asked, is the "vital unit" which is never to intermix? According to Major Young it is "the *smallest* which is (1) complete in itself, (2) can act independently in all situations, and (3) can prolong such action independently." In other words, it is the company. "You may," he says, "break up double companies, battalions, or brigades; you may shuffle in any way the battalions in a brigade, or the companies in a battalion; but the moment you touch the company you strike straight at the root of all discipline, and with it steadiness. Moreover, the only smaller units, the half-companies and sections, are not true units, nor complete in themselves, nor large enough to act throughout an attack independently without shrinking to nothing. The rôle of the section is as the fire unit, not as the tactical unit. But it may be said of our present mode that it does keep the company intact; no doubt it looks pretty on a parade-ground to see the left half-company coming up just when and where it should do with regard to the right half company; but for real work we want a body which, when it does come up to reinforce, can go into the line anywhere without any consideration of what sections, companies, or battalions it goes in between." Though some may differ with Major Young on certain points, it must be allowed that he has common sense on his side when he writes thus fearlessly in condemnation of our system as it is stands. It is not a perfect system—very far from it. The utmost, in fact, that can be said for it is that it is the best we have got, and that it supplies a temporary and pressing want. But what has the essayist to say as to improvement of system? Here, again, we will let him speak for himself: "From long study of the subject, I am certain," he says, "there is only one way out of this great difficulty—viz., to grasp the fact that there is a certain *vital unit* which must never be intermixed however often the line be reinforced, and that this unit is the company; that its normal formation must be a single rank at one pace per man, with an automatic change to a double rank where crowding occurs; that the front line be throughout the attack simply a line of companies moving independently in a general line, and that all reinforcements be by entire companies inserted into gaps caused by the companies in the front line closing on their centres at each rush forward sufficiently to fill casualty vacancies." The size of gap and mode of reinforcing may not be quite clear in the author's summary. As we understand his argument, it is as follows: In our existing drill a half-company of, say, 30 men, requires a gap of 60 paces. Under that proposed, the same gap suffices for the whole company—60 men=60 paces. Nor is this all: by using the double rank temporarily until there is room, a gap of only 30 paces will suffice—60 men=30 files=30 paces,—or the same gap as now for only a section. Either mode would be used presumably according to the circumstances of the moment by the captain of the reinforcing company; but the double rank being just as safe practically as the single rank, the second mode would, we have no doubt, become the ordinary one. Thus each reinforcing company would go into the line in a gap of about 30 paces, gradually expand—as it gains single rank—to a front of about 60 paces, and then begin again to contract towards its centre, as it loses men, thus creating fresh gaps on its flanks into which in turn fresh companies enter. Ob-

viously this process can continue *ad infinitum*, quite unaffected by the number of reinforcing lines. One thing is certain—viz., that whatever is to be the tactical unit must likewise be the unit of reinforcement; and *vice versa*. whatever is made the unit of reinforcement will, by force of circumstances, become the tactical unit. To hope to reinforce by any fraction of the tactical unit and maintain cohesion is an illusive idea born of the parade-ground. There is undoubtedly much that is sound in the idea put forward, and it is not surprising that those with whom rested the duty of awarding distinction to several competitors singled out this paper for special mention. The question of the attack has formed the subject of much controversy for years past. The highest authorities have expended thought upon it, and change after change has been introduced after more or less mature deliberation. But we have not reached the ideal yet, and never shall do, we suppose, so long as science progresses to upset preconceived notions and alter everything. Discussion, however, is a thing to be encouraged at all times, and in this instance the views expounded are such that we are disposed to stretch a point and afford the essayist every opportunity in our power of making his ideas known. There must, of course, exist a difference of opinion as to the merits of the scheme here formulated; but the paper is one that recommends itself not only on account of the independence of its tone, but also by reason of the general soundness of its reasoning and the clearness of its style.—*The Army and Navy Gazette.*

THE TACTICS OF COAST DEFENSE.

On Wednesday last Lieut-Colonel Walford, R. A., read before the Royal United Service Institution an interesting paper on "The Tactics of Coast Defense." The lecturer in the first place remarked that in a previous paper read by him in May last, his intention was to make one fact perfectly clear, viz., that any system of defense which is to have even a fair chance of success must be based upon the co-operation of all the following several fractions :—*a*. The active defense, consisting of such ships, torpedo-boats, etc., of the Royal Navy as might be detailed to the particular harbor in question. *b*. The passive defense, consisting of the guns, the submarine mines, the torpedoes, the water defenses (such as guard-boats) and the electric light. Combination and concentration of energy must be provided for, not only between each factor of the defensive strength, but also between every unit of each of these factors. He proposed, therefore, to commence his present paper by discussing what should be the organization of the system of command in a coast fortress, and to add some notes on the duties of the various grades of commanders.

Colonel Walford, after stating that he did not intend to refer to any existing fortress, and that he should pass over the question of the land defense as coming rather under the head of Siege Tactics, and confine himself almost entirely to action against a naval force, went on to state that the system of command in a coast fortress should, like all other systems of command, be based upon the principle of the undisputed authority of the superior officer over each of the complete units which make up his command, combined

with the almost absolute independence of the officers commanding those units within the limits of their command. Instruction and practice in the correct execution of orders should form a part of the system of training in time of peace, and should not be either given or required when in the presence of the enemy. A distinction must be drawn between an "order" and a "word of command;" the latter must be obeyed to the letter, and mechanically, the former in the spirit and intelligently. The chain of command proposed may be summarized as follows: The commander of the fortress, the commanders of defenses, of sections, of units (such as forts, batteries, mining and torpedo stations, etc.), and of groups of guns, or (generally) of fractions of units. The officer commanding a fortress would have charge of the general conduct of the defense (including where necessary, the government of the civil population), and of all communications with the enemy, he would be the head and the heart of the defense, but it would be well that he should not endeavor to be the hands also.

The duties of the commanders of defenses, *i.e.*, the active, or sea defenses the passive, or coast defenses, and the land defenses, would be, each in his own sphere, to provide for the due execution of the orders given by the commander of the fortress; generally speaking, they will knit together for combined action the various sections which are under their command. The commander of each section would arrrange for the combined action of all the units which compose it in such a manner as may best carry out the intentions of the commander of the fortress, which will have been explained to him by the commander of the particular defense under which the section may come. The commanders of units, within the limits of the coast defenses, would be as follows: Artillery Officers commanding the main forts and batteries armed with heavy and medium guns; officers commanding the batteries of guns intended for high-angle fire; officers commanding the light armament, provided for the defense of mine fields, and officers commanding the movable armament, consisting of Field Artillery. Engineers—Officers in charge of submarine mines; officers in charge of torpedoes; and (other arms) officers in command of detachments of Infantry.

All the above, when present, should be under the command of the officer commanding the section. The electric light should in all cases be under the orders of the officers commanding artillery units, as it is far more urgently required by them than by the officers in charge of submarine mines. The guard-boats, steam launches, etc., which make up the water defenses, should be employed rather for the advantage of the whole system of defense than for that of any one fraction, and therefore the direction of the action of the water defenses should be placed in the hands of the officer commanding the coast defenses, and not in those of any local authority, To the commanders of units named above should be committed all matters connected with the technical duties of their several arms, and they should be each independent of the others as regards the actual working of their commands. Commanders of subdivisions of units will be the junior officers of each arm, such as the commanders of groups either of guns or mines; they will be responsible for the state of preparation and the efficient work-

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ing of their respective commands, and will attend to minor details of equipment, the supply of ammunition, stores, etc.

The lecturer then proceeded to give in considerable detail the several duties of the various grades of commanders in anticipation of an attack, and gave a slight sketch of the system suggested for the supply of the troops, the transport of wounded, the replacement of casualties, and the renewal of ammunition.

Colonel Walford next considered the duties of the various grades of commanders during the progress of an action. A little consideration of the tactical conditions of the defense of a fortress will show that the position of the commander of a fortress is very different from that of a general in command of a field which is standing on the defensive. In the defense of a coast fortress (omitting that of the land fronts), by far the larger proportion of the available force will be absolutely without mobility, since the guns, mines, and torpedoes will be fixed in localities long previously selected, and thus all power of movement, and therefore of counter-attack, will be limited to the sea-defense, the water defense, and the infantry of the coast defenses; while of these the offensive power of the second will be very limited, and that of the last available only in the case of a landing by the enemy. On the other hand, the assailant will, except in the attack of an open roadstead, be compelled to advance on lines which will have been realized and studied beforehand, and will thus cease to possess that initiative which conduces so much to the advantage of the attack, but which is only possible on the supposition that there is no limit to manœuvring. Since, for the above reasons, the strokes and counter-strokes of the attack and the defense will, in most cases, proceed in more or less regular sequence within hard and fast lines, it follows that the share in the defense which falls to the commander of a fortress will find most of its active expression before the actual commencement of the combat. The duties of this officer might, therefore, be summed up as follows: 1. The consideration and approval of any measures of the counter-attack which are proposed for the sea-defense. 2. The suggestion of approval of any counter-attack by the land forces which may require the assistance of the central reserve. 3. A decision as to any enlargement or variation of the scheme of defense which may become desirable, owing to the partial success of the assailant.

In the case where the commander of the fortress is a military officer, it is very desirable that the commander of the sea-defense should be not only permitted, but encouraged, to make suggestions with regard to the use of his command, and to point out such opportunities as may arise for its use against the enemy; he should always be consulted with regard to the time and dispositions for any counter-attack by sea. The commander of the coast defense, will, in addition to the general charge of the whole of the coast forces, have under his direct command the local reserve, the movable artillery armament, and the water defense. It is not necessary to say more of the local reserve than that it will be employed to resist boat attacks and landings in small force, and also to provide for such a system of outposts as shall prevent the possibility of a surprise by night. The movable artillery armament will as a rule be associated with the reserve in the discharge of

these duties; it may also be required to assist the light armament in the protection of mine-fields, in which its mobility, and consequent power to change its position, will be of great advantage.

The commander of the coast defense should devote especial attention to the water defense. It would at the same time be very undesirable to limit his duty to the conduct of this small fraction of the defense, and he should exercise supervision over the whole of the general conduct of the action, and should be present in person near the point of the main attack.

The defensive action for the commanders of sections might be in most cases roughly divided into three phases, viz.: 1. The period of high-angle fire. 2. The defense of the mine-fields. 3. The close fighting of the forts and batteries. Of these, the first will, as a rule, be completed in each section before the last two commence. The second phase includes the combined action of the mines, the light armament, and (occasionally) some portion of the main armament. After the destruction of the mine-fields, and (perhaps) the silencing of the light armament, the main attack at decisive ranges will commence. The commander of the section should have made preparations for this by, if possible, laying fresh mine-fields under cover of the main armament; if this be not feasible a moderate use of dummy mines might tend to cause the enemy to hesitate or to move with caution. The guns and the torpedoes will, however, be the principal arms employed during this phase. It is the duty of the commander of a section to direct the action of each of the units under his command upon such objects as he may deem it of importance to engage.

The lecturer confined himself to the mention of a few of the principles which should guide commanders of units when in action, as follows: 1. There must be absolute and immediate obedience to the spirit of the orders and instructions transmitted by the commander of the section, who alone is able to judge of the relative importance of the various targets. 2. Ammunition must be carefully economized, both with respect to the rate of fire and also with regard to effective range. 3. Smartness and decision in the selection of the projectile and in the orders given are most necessary; hesitation entails not only loss of time by the officer, but also loss of confidence by the men. 4. It should be remembered that the duty of a commander of a unit is to fight only; he has nothing to do with tactical combinations, which must be left to the commander of the section, who alone is responsible for the proper selection of the object of the action of his command. 5. The commander of a unit has therefore no right to change his target without having received orders to do so; if this were permitted, it would lead to the frittering away of fire at the discretion of irresponsible officers. He is at liberty, however, to draw the attention of the section commander to any change which may appear desirable.

As to the duties of commanders of subdivisions of units, Colonel Walford contented himself with calling attention to two points, namely, the supply of ammunition and the replacement of casualties within the fort, battery, etc., while actually engaged. When the commander of a unit is posted in a station beyond the limits of his command, it will obviously be impossible for him to attend to this matter; while, even if we suppose him to be

actually present with the guns, his attention will be so taken up by his sole duty, the conduct of the fire, that he will have no leisure for minor matters; it follows, therefore, that these must be left in other hands. In small forts, etc., such details might be left to the commanders of groups and their representatives in the Engineers, but in the case of large works it will be necessary to tell off a special officer to take charge of these and other cognate matters within the fort; this officer should be senior to the commanders of groups.

The lecturer then turned to the consideration of an adequate provision of means of intercommunication between the several grades in the sequence of command as being absolutely necessary to permit of the working of any systematically combined plan of defense. Too much stress could not, he said, be laid on this point, since without such provision of a sufficient kind many opportunities must be lost and much disadvantage suffered, for without it the chain of command is broken, reciprocal action becomes hopeless, and the concentration of fire impossible. Those who have not carefully considered the conditions which govern the defense of coast defenses are inclined to undervalue the importance of this question, since, remembering only the size of the target offered by a battle-ship, they forget or do not regard her power of rapid movement. Officers, even of the artillery, are inclined as a rule, to imagine that the service of coast batteries is a duty which may be deliberately carried out, and are tempted to believe that, as the guns are heavy, so the work must be slow. It is true that in cases where the nature of the channels or of the coast line compels the attacking ships to anchor in order to obtain full effect from their fire, this may be in some degree the fact; but, under circumstances which permit them to take advantage of even a moderate rate of speed, the movement of the target is far quicker, and the opportunity for efficient fire far more fleeting than is the case with the targets offered to artillery in the field. No force in the field, not even galloping cavalry, can equal, except perhaps for a few minutes, the speed of a ship which steams at the low rate of 12 knots per hour—a pace which may, under ordinary circumstances, be maintained during the entire progress of an attack. The guns and mines of a system of defense must, therefore, be prepared to cope with an enemy gifted with the power of exceptionally rapid movement. and their conduct in action must be proportionately accelerated and simplified. This acceleration, if it is to be combined with a facility for insuring co-operation in action, can be obtained only by means of a complete system of rapid intercommunication between the various fractions of the defense.

It will be evident that oral signals, whether by speaking tubes or the telephone, will be useless in the noise of action, while visual signalling, by means of flags, semaphores, or cones, is not only slow and liable to error, but suffers moreover from great disadvantages, viz.: 1. It is possible that the signals may be read by the enemy, especially since the code must be made out beforehand, and the enemy may thus have an opportunity to gain possession of the key. 2. The flags, etc., point out to the enemy the position of the spot from which orders are emanating, and thus enable him to bring fire to bear upon the local centre of defense. 3. Such signals would

be useless at night or in a fog. If we abandon all such systems as useless, we shall find ourselves limited to electric (or perhaps pneumatic) communication, such as shall record the orders given on a dial or similar contrivance at the receiving station. The provision of such a system would certainly be expensive, but, since the value of artillery fire, in coast defense as well as in the field, depends entirely upon its concentration, it is probably no exaggeration to say that more advantage would be gained by the creation of such a network of communications between important points, than by increasing the weight or the number of the guns.

It is especially necessary to provide some such system of communication between the commanders of units and the group commanders of artillery, since when in action the former must transmit orders to the latter at least once per minute, in cases where the guns are (as they should and probably must be) directed from a station beyond the limits of the fort. Under such conditions electric communication is indispensable, as it is also between the unit and section commanders, while the further provision of lines to the commander of coast defenses, and from him to the commander of the fortress, would be a small and simple matter. These last lines might be improvised in anticipation of an attack, and might even without any very serious disadvantage be dispensed with, for the general tactical plan of the defense will seldom be liable to any very sudden change of conditions or to any consequent instantaneous alteration since the tactical considerations are more or less permanently fixed by the character of the site. But with respect to the forts it is absolutely essential (under penalty of an enormous loss of efficiency) that immediate communication shall be possible between the groups and the unit commanders, who are in truth the eyes of the guns.

The lecturer, in drawing his paper to a close, stated that he had endeavored to sketch a coherent system of command applicable to a coast fortress, to show the duties of the various grades of officers included in it, and further to show the urgent necessity for the provision of a complete network of intercommunications within the fortress; but he had not, he regretted to say, been able to mention other points of almost equal importance, such as: 1. That all officers and men, especially of the Auxiliary Artillery, should be drilled and worked in the actual forts which they will have to defend in action. 2. That all officers of artillery should be trained in the duties of group commanders, while all field officers should be competent to act as commanders of units. 3. That the entire scheme of defense for every fortress should be drawn out on paper in time of peace, and that this scheme should include all matters connected with the distribution of supplies, hospital accommodation, and the renewal of ammunition. 4. That all officers who by this scheme would be called upon to discharge the duties of one or other of the grades should be confidentially warned of the fact during peace, and should be expected to qualify themselves for those duties. 5. That every fort in each fortress should be occupied by Regular Artillery during some portion of each year, during which time practice should be carried on (under Service conditions, and not by the fire of individual guns), and all defects should be noted and made good. 6. That the mobilization of the garrison in each fortress should be carried out at least

once a year by day and night. *He desired to draw a conclusion from the paper, viz., that this matter of coast defense is not a purely Artillery or Engineer question, but equally concerns officers of Infantry. He did not mean by this that we have any right to expect officers of Infantry to study details connected with gun drill or the construction of submarine mines; but that officers of Infantry should be accustomed to realize that, when defending a coast fortress, they may be called upon to take a very prominent part in the struggle, and that therefore the principles of coast defense were not unworthy of their attention.—United Service Gazette.*

THE GERMAN GENERAL STAFF.

The axiom that responsibility conduces to the development of power has never been better illustrated than by the sterling ability of the officers of the German army. To speak of the General Staff of that highly organized force as its "brain" does not wholly represent the truth, for in every grade above that of subaltern, and even to some extent in that, the *German officer possesses a certain freedom—even a right of initiative—with corresponding delegated responsibility, independent of the central authority.* We mean, for example, that the captain, in regard to his company, may, in the exercise of his judgment, adopt such methods of instruction, within limits, as he pleases. His superiors look to him for results. In the *Felddienstordnung* of 1887 it is prescribed that, "without fearing responsibility, every officer, in all circumstances, however extraordinary, is to stake his whole personality for the fulfilment of his mission, even without waiting for orders." He knows very well that his chances of success in his career depend upon this fulfilment, and this almost precludes the promotion of incapable men. In an excellent little volume which we have before us,* and concerning which we propose to make a few remarks, Mr. Spencer Wilkinson describes the steps in the advancement and training of the German officer, and rightly says that, by the time the officer attains General rank, "he has acquired a vast and varied experience; a practised eye, whose rapid and penetrating glance on the march and in the field seems to laymen almost miraculous; and a sureness and swiftness of judgment which decides without fail in an instant nine-tenths of the questions which arise in the exercise of command." It may be said, in fact, that the training of the individual—the development of the highest powers both in the field of thought and action—is the prime object of German military institutions. Nevertheless, if any one were asked what is the most prominent feature of the German army, the answer would probably be, "Its organization," which, indeed—possessing the double advantage of centralized and extended intelligence and control—approaches, in its fine adaptation of means to ends, more closely to perfection than any other like organization that the world has ever seen. The purpose of Mr. Wilkinson's book is to describe the central thinking body of the German army—the "brain," as General Brackenbury has called it—and its relations, of action and reaction, with the ranks. He has written it for the statesman, if "at any time such should

* *The Brain of an Army; a Popular Account of the German General Staff.* By Spencer Wilkinson. London: Macmillan & Co.

be found to undertake the work of an English Minister of War," as well as for the public upon whom that statesman would depend, convinced that, being perfectly familiar with the German Staff, "he would be able to reform without destroying, to rise above that servile imitation which copies defects as well as excellencies, and, without sacrificing its national features, to infuse into the English system the merits of the German." To our thinking, the most noteworthy point concerning the German General Staff is the close relationship which it constantly maintains with the ranks, and the influence the Staff and the ranks have upon one another. This will be explained by a quotation from Mr. Wilkinson's book:

"A captain on the Staff, after four or five years' work, is transferred to a regiment. A year or two later he may be again selected for the Staff as major. After a further term he will receive the command of a battalion, then return to work on the Staff, and afterwards be promoted to the command of a regiment. From this post he may again be chosen to the Staff, returning eventually as a major-general to the command of a brigade. * * * Service in the staff-office of a division or army corps alternates with employment on the great General Staff, so that the officer whose diligence and ability have opened for him the Staff career, and whose performance secures him periodical return to it, passes through the various stages of regimental service, of service on the General Staff of the great constituent units of the army, and of employment in the great central agency of direction. * * * Nearly all the higher commanders have passed through the various stages of duty in the General Staff. The General Staff is perpetually training fresh generations. Some sixty junior officers are temporarily attached to it without being incorporated,—that is without ceasing to belong to their regiments. They are the pink of the hundred lieutenants who every year leave the Kriegsakademie, or Staff College of Berlin. * * * In this way the General Staff keeps up its numbers by the continual selection of the fittest."

We need not dwell upon the advantages that flow from this constant intercommunication. Regimental officers, either by their own experience or through that of their companions, are in perfect touch with their ideas of the "great central thinking department," and this department in turn derives a full measure of benefit from the practical knowledge of men fresh from nearly every grade in the ranks. The General Staff numbers in all about two hundred officers, seventy-five of whom are with the army corps and divisions, while a hundred approximately, form the great General Staff in Berlin, some fifty of these latter being on the auxiliary establishment for purely scientific work. No experience could be more serviceable than that gained during the Staff employment of these men. The Intelligence department of the work of the great General Staff is singularly complete. It takes cognizance of every possible fact the knowledge of which might be of service in a war with any country. Its officers are constantly engaged in collecting and classifying a vast quantity of information concerning the various States of Europe, and other States in smaller degree,—their maps, surveys, plans, guide-books, and books of travel; their census and educational returns; and their constitution, administration, finance, emigration particulars, natural resources, manufactures, trade, shipping, and means of communication, as well as every statistic relating to their armies and navies and their coast and other defenses, and a whole host of other such matters. As Mr. Wilkinson says, "the minute systematic study which is thus devoted

to the resources of every European country gives a basis for judging of its fighting-power far more certain than the collection of mere military statistics;" and we may add that the officers who are engaged in such work are admirably fitted for service abroad. The great General Staff makes provision for every possible campaign, pays the utmost attention to all questions of mobilization and transport, and has a division devoted to the manipulation of railways in war, on which an attempt is made to give service to every General Staff officer. The Trigonometric, Topographic, and Cartographic Departments of the Government Geographical Establishment are served by officers on the auxiliary establishment of the great General Staff. It will be seen that the work in the Intelligence and other Departments, combined with regimental service under direct responsibility, forms an admirable training and discipline for military officers; but the Staff takes upon itself a teaching function also. The War Academy, in which the ideas of Scharnhorst have been developed and expanded, is under its direct authority and control. The *Dienstordnung* of the late Emperor Frederick defines the purpose of the Academy thus:

"The object of the War Academy is to initiate into the higher branches of the military sciences a number of officers of the necessary capacity belonging to the various arms, and thus to enlarge and extend their military judgment. Side by side with this direct training for their profession, they are to endeavor, in proportion to the requirements of the army, to penetrate deeper into certain departments of formal science, and to acquire mastery in speaking one or two modern foreign languages."

One of the chief means employed by the General Staff for the training of officers for the duties of command is the study of military history according to the ideas of Clausewitz, and, as our readers are aware, several works of singular value have been published by its Historical Department. It is not enough for an officer to know the facts. He must understand their relations of cause and effect, and form a judgment as to the fitness of the means employed for the ends which it was sought to attain. Valuable as is the work of the General Staff in many directions, and powerful as is its influence upon the army, that work tends specially, as Mr. Wilkinson says, to the decisive act "by which the Chief of the Staff, from the information he has thus acquired, constructs a problem and designs its solution,—puts to himself the question, 'What is now to be done?' and answers it." The institution of the General Staff, as he remarks, is in reality the development of a single idea, the embodiment of a logical analysis; but the military idea is kept in harmony with the political by the chief command of the Emperor, who holds, in both spheres, supreme control. Admirable, then, is the German General Staff, and in many ways noteworthy; and it is in no degree surprising that Continental States, which have to meet like conditions, are tending to an imitation of it. But for ourselves, much as we shall gain from a minute knowledge of its constitution and duties, we must remember that the conditions we have to face and the work we have to do are essentially different from those before the Germans, and that therefore it will not be enough for us merely to copy their military "thinking department," as General Brackenbury has styled it, in order to create one wholly suitable of our own.—*Army and Navy Gazette.*

Comment and Criticism.

I.

"Outline of a Manual of Infantry Drill."

Prof. Peter S. Michie, U. S. M. A.

THE system of infantry drill tactics, outlined by Colonel Hawkins, certainly presents some striking departures from those now in use in our Service, and while we all agree that our present system requires radical modifications to adjust it to the new conditions of rapid fire, we must await the results of the labors of the Tactical Board for the solution of the problem. The devising of a system of tactics by a board of officers is even in itself a departure from the custom of our Service, since up to the present time our steps to the front, flank and rear have been wholly directed by the genius and thought of a tactician, singly and alone. In the system here outlined we have an individual solution of the problem offered for our unsparing but honest criticism. I have been so long accustomed to witness the well dressed and compact lines of our cadet double-rank companies moving over the level drill ground with such precision and with the elastic step of healthy youth, that the open order and four ranks of Colonel Hawkins' company do not at first commend themselves as a pleasing substitute. This sentiment, of course, cannot hold for a moment if we recognize that in the future the touch of the elbow must be sacrificed for the greater independence of action of the individual soldier. The plebe and the recruit in any new system are no longer to fix their steady gaze on the seam of the coat collar of the man in front, but must employ their perceptive powers on the movements of the enemy and their own progress to the front.

Granting that some such system is to be adopted, it is apparent that the rank and file must be men of greater intelligence and individual courage, of increased self-reliance and with more confidence in the skill and ability of their company officers than is now essential. And to offset the difficulty of obtaining such men in great numbers, we can see that, even with the few, the tactical advantages will be more quickly perceived, so that, when taken advantage of, the results on the field of battle will be more decisive than before. In actual combats there are two tendencies arising, even in the bravest, from the instinct of self-preservation, which largely control individual action; one is first to run away, which, being overcome, is followed by the desire to get as near to his neighbor as possible, to lessen the chances of being himself hit. Both of these tendencies will be very active in any open order of company formation, and can only be lessened by increased discipline. Mobility is certainly gained in the open order, but at the expense of steadfastness, especially in awaiting attack or active engagement under fire. That in the system proposed there is a great gain in both mobility and celerity is evident from the example cited by Colonel Hawkins, where this point was tested in the presence of officers, with troops of our Service. It is to be hoped that this system, which presents many advantages and few defects to the non-expert in tactics, will be subjected to the severest tests that its critics could devise or suggest.

Lieut. E. E. Hardin, 7th Infantry, U. S. A.

It is much to be regretted that we have only heard the outline of what must strike any infantry officer as a new and admirable system of drill for infantry.

The time saved in the formation of the company is of great advantage in any case, and would be of incalculable value in case of a sudden attack or surprise.

The open order system gives a peculiarly flexible column or line, and a simple and rapid means of developing the line or column into a line of skirmishers or into a line consisting of skirmishers, supports, reserves and main body.

The system also admits of the column or line being compressed into a mass as compact as necessary, for all manœuvres, such as marches where space is the first consideration, when it is necessary that an army should not be scattered.

Any system of drill prescribing certain fixed distances, absolutely, whether it be facing distance or elbow room must be faulty, whereas this system prescribes means for varying from facing distance to as many yards as may be necessary.

The ingenious manner in which calling off numbers has been avoided must command the admiration of the numerous officers who have attempted the solution of that problem, and given it up in despair.

The abolition of the numbers, besides the time it saves, gives a man a chance to think. In order to preserve the perfect drill under our present system, each man must concentrate his attention on remembering his number, and it would be a great advantage for him, no longer having that burden on his memory, to be able to use his mind for a more intelligent purpose.

I am sorry we have not been able to hear something more about the drill of several companies, but that is a matter of detail. The manœuvring of a battalion or of a regiment can doubtless be as well managed under this system as under any other, and those advantages which are apparent from what we have heard, would doubtless increase, as the system is applied to more troops.

This system appears to me to be readily adaptable to the system of fighting approved by modern authorities.

A regiment composed of three battalions of four companies each, the company being the unit of administration, and the battalion, composed of four companies habitually kept together, being the fighting unit, would be a command easily handled, capable of occupying a front of proper extent against all comers. The 300 men composing each battalion would be known to each other, and the advanced line could be reinforced successfully as often or as strongly as necessary without mixing commands, except the companies of the same battalion, which would be no more a cause for confusion than the mixing of the different squads of a Prussian company.

I think a field officer, four captains and eight lieutenants to the battalion would be enough officers, and do not think four lieutenants necessary to a company, but I do not imagine that the number of lieutenants assigned to a company would be in any way essential to the system.

Lieut. C. J. Crane, 24th Infantry, U. S. A.

The system of drill for the infantry presented by Colonel Hawkins is certainly far in advance of our present tactics and seems to meet the demands of the time for quick deployment under almost all possible conditions. By the methods explained for deploying the "normal line" and the "column of route," a firing line can be formed very quickly and easily.

The fact that the men would have at all times plenty of room to lie down, for rest or concealment, is a strong point in favor of the proposed "Company Field Drill."

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The manner in which a skirmish line is to be advanced to the front or moved to the rear, viz., by "rushes" of alternate ranks, seems to be in accordance with the most modern opinions on the subject, and the method proposed for street fighting is a good solution of that problem.

"The line formation may have any extension from the touch of the elbow, if desired, to three or four times the front," etc. I suppose this will enable us to get from the "line of two ranks" faced to the right or left, a column of twos with sufficient distance between men to allow easy walking, such a formation being necessary for marching in the far West and along the country roads of the South, where there is often not room enough for a column of fours.

In giving us on the drill ground practice in so much that must occur on the battlefield, the system of Colonel Hawkins would put us fully abreast of the most modern ideas relative to the attack and defense.

To furnish the four lieutenants and eight sergeants for each company, as shown in the diagrams, a reorganization of the infantry arm of the Service would be necessary, but three battalion regiments and larger companies for the infantry are only questions of time.

I am sorry that the outlines of the "Manual of Infantry Drill" furnished us are so brief, but am very glad that this system, which I had often heard of, has at last been outlined to us.

II.

"Mackenzie's Last Fight."

Lieut. William H. Bowen, 5th Infantry, U. S. A.

I HAVE read with great interest Captain Bourke's "Mackenzie's Last Fight with the Cheyennes."

While according Generals Crook and Mackenzie every honor, justice must be rendered to one other before the concluding paragraphs of Bourke's narrative become accomplished facts, viz., Brig.-Gen. N. A. Miles.

Captain Bourke seems to forget the fights of Miles at Cedar Creek, Montana, October 27, 1876; at Wolf Mountain, Wyoming, January 7 and 8, 1877, and at Muddy Creek, Montana, early in May, 1877, besides a whole "Summer Campaign" during June, July, August and September, 1887, against the Sioux and Cheyennes, when he writes: "But the Spring Campaign was not to be." And again, "The game was in *our* hands."

For the result of Miles' Wolf Mountain fight see General Sheridan's "Record of Engagements with Hostile Indians," page 67. To controvert Captain Bourke's claim see his "Mackenzie's Last Fight," page 220, lines 34 to 38, as published in the JOURNAL of the M. S. I.

Bourke's narrative concludes:

"* * * *our* expeditions * * * has * * * supplied our national standard with the beautiful stars of the two Dakotas and Montana, * * * " leading the general reader to infer that Generals Crook and Mackenzie were the only leaders to whom the Nation's thanks are due for this glorious achievement.

Ask any old Montanian—and by old I mean residents of Montana prior to 1881—"Whom have we to thank, above all others, that Montana is now a State?" The answer will be, "Miles."

Please publish the foregoing in the next number of the JOURNAL.

FORT DAVIS, TEXAS, March 8, 1890.

Major G. W. Baird, Pay Dept., U. S. A.

Thanking the JOURNAL for its courtesy in the March number, I have to request a repetition of the favor.

Near the close of Captain Bourke's article, "Mackenzie's Last Fight," in the March number, he makes mention of Crazy Horse and, speaking of Spotted Tail, says "he started out to see Crazy Horse and had no difficulty in letting that stubborn redskin understand that he must come in on the full run." Writing, as Captain Bourke does, with full knowledge of the events, he seems to have presumed a like knowledge on the part of all of his readers, and so to have omitted the essential and efficient cause of Crazy Horse's surrender. Hence the picturesque statement above quoted is not wholly graphic and might possibly mislead. After the surrender to General Miles of Sitting Bull's following—mentioned in my note in your March number, "there remained," as Captain Bourke states, "but one band of any size, in spirit to fight, on the American side of the British line, the band of Crazy Horse," etc. This in the late fall of 1876.

Crazy Horse's following were camped on Tongue River. On the 29th of December, 1876, General Miles led a force of four hundred and thirty-six officers and men from Cantonment at the mouth of Tongue River against this force of hostiles. Miles' command was made up of Co's. "A," "C," "D," "E" and "K," 5th Infantry, and "E" and "F" 22d Infantry, each company augmented by details from other companies of the same regiments.

After skirmishes on successive days the Indians selected the cañon of the Tongue, where the river breaks through Wolf Mountain, as the place where they would annihilate the troops, and, on the 8th of January, 1877, turned upon them with their entire force—shouting, "You've had your last breakfast." The battle was a skilfully and a hotly contested one, lasting five hours, but a description of it is not my present purpose. The Indians were driven from the field with much loss.

The severity ot the weather and all of the hardships and augmented difficulties attending a winter campaign can be partly inferred from Captain Bourke's narrative of the autumn expedition of which he writes. Following up this success General Miles sent an ultimatum to Crazy Horse, employing for that purpose some of the Indians captured in the skirmish of January 7th, accompanied by Interpreter John Brogvier. The General's message was "Surrender, either here or at your agencies, as you choose, or I will fight you again." Large delegations of chiefs and head soldiers, including Little Hawk, an uncle of Crazy Horse, came to the Cantonment on Tongue River to see if they could get better terms, and having become convinced, after repeated councils, that they could not, and knowing from experience that the threat in the ultimatum was no idle one, Little Hawk and the rest guaranteed to either bring the camp to the Cantonment or take it to the lower agencies. They left nine prominent men and head warriors, Sioux and Cheyenne, as hostages for the faithful execution of their agreement. This surrender was carried out; some three hundred came, April 22, 1877, to the Cantonment; the main camp, more than two thousand, led by Crazy Horse, Little Hawk and others, surrendered at Red Cloud and Spotted Tail agencies on May 1, 1877; the lapse of time indicating the figurative use of "on the full run" before quoted. By giving this an early insertion in the JOURNAL, you will do an act of justice to an efficient and successful force, including several members of the Military Service Institution, and will, perhaps, convey an item of interesting information to some who are not fully informed as to General Miles' winter campaign of 1876–77.

BOSTON, MASS., March 13, 1890.

Reviews and Exchanges.

Great Captains—Alexander.*

THIS is the first of a series of works which the author has in preparation on the Art of War. His intention, as stated in this volume, is to trace the development of the art from its earliest appearance on the pages of history down to comparatively recent times.

The evolution of the Art of War, as indeed of any other art, may be divided into well-defined periods, each of which has its beginning in the life of a master. The life of such a master is an era in the art, a revival as it were, during which great activity prevails and great advancement is made. New principles are recognized and established and old principles receive new applications. But these eras or revivals are of short duration. When their creators die their sun is set. There may follow a longer or shorter twilight, during which the influence of the great vivifier is still felt, but its effect soon fades out and the art sinks into sleepy routine, during which the methods of the master, although still practised, are not understood. And so night comes, and the art sleeps until aroused to a new life by the next master.

The lives of such masters, then, constitute the history of the art, and here in an attractive form we have the first chapter of that history. It is a goodly book; well written; well printed; well illustrated; well indexed, and generally well gotten up. It reads like a romance, and lives in the memory like a fairy tale. It has one feature which deserves special mention. Its chapters are preceded by a short, comprehensive and correct synopsis of their contents. This will be of great benefit to the student.

The works from which the author has gathered his facts—many of them rare—would constitute a fair sized library in themselves and indicate in some measure the amount of labor expended on the work. We are greatly pleased at the general appearance of the work, and almost regret the necessity of turning towards its pages in a spirit of criticism.

When the author says in his preface—page 14—that "Alexander created the Art of War," we hardly think he means it in an unqualified sense, because he proceeds on page 6 "To say something about his predecessors." And a very interesting story he makes of it. The military systems of the Babylonians and neighboring nations, and of the Jews under David and Solomon, cleverly sketched in the third chapter, clearly indicate that military methods were not unknown before Alexander's day. Among the Jews we find an excellent militia system, and a method of recruitment by draft in time of war, which the makers of the military systems of modern Europe have hardly improved upon. The fact that the Jewish nation in the days of King David had an enrolled militia of 1,300,000 men, and that each tribe furnished 24,000 men for active service, compels us to admit that modern military systems are no new invention.

But there were other systems in ancient times which deserve a passing mention. In Egypt a rather unique method of creating and maintaining a military force was adopted by the father of Sesostris, and seems to have had a prolonged existence. The

* *Great Captains—Alexander.* By Theodore Ayrault Dodge, Brevet Lieut.-Colonel—retired.

story of its existence would constitute a very interesting page of military history. The system had its beginning in the enrollment of all the boys born on the same day as Sesostris. These boys and their male descendants were trained as soldiers from their infancy. They constituted that military caste of Egypt which, after centuries of honorable service, sank into insignificance some 1200 years before Christ.

In closing his masterly sketch of Oriental armies anterior to Alexander's day the author says—page 24—that "Cyrus subdued as large a part of Asia as Alexander did after him, holding the cities as *points d'appui*." There must have been method in such management. Indeed, all that the author says in Chapter III. should be taken as the needful qualification of his earlier assertion, that Alexander was the father of the Art of War.

Moreover in Greece the Art of War had taken formal shape centuries before Alexander's day. Indeed the principles of tactics seem to have been very well understood in all powerful ancient kingdoms, and if we had complete records of their campaigns we should doubtless be able to divide up these seemingly dark centuries into periods marked out by the lives of forgotten masters, whose methods have escaped the pen of the historian. In all ages military tactics have been merely explanations of the best methods of using the weapons of the day. As soon as men began to act together in masses the opportunity for the tactician appeared, and unless human nature was very different from what it now is, the tactician appeared with the opportunity. This we think is sufficiently proved by the existence of vast empires which could neither have been the creatures of chance nor the children of ignorance. The methods of the conqueror must always have been superior to those of the conquered, and however crude the best of them may have been, they constituted a system the practice of which must be called an art.

In those days the soldier was a much more important member of the body politic than he is to-day. Among the ancient Greeks military service was the only key that would open the way to civil preferment, and crippled soldiers were cared for by the state. No wonder there were heroes in those days. But there was one decidedly weak feature about the ancient military system of Greece. Their leaders commanded by turns—day or week about. There is something decidedly democratic in that idea, and it seems to find favor with at least one modern nation. But it will not work. It was a failure in ancient Greece, and it will prove a failure in modern France.

The assertion that the ancients before Alexander's day knew nothing about strategy, which we meet at intervals throughout the book, depends for its accuracy upon the definition of strategy. History is somewhat barren on this point. As the author says on page 45: "We can gather nothing from the legends of Ninus Semiramis and Sesostris which lends aid to modern war." This is very true. But we are not justified in assuming that nothing existed. We find Cyrus—page 48—"acting on that oldest and soundest of military principles to do that which your enemy least expects," and the chances are that he was not the first commander that did so. Anti-Alexandrian strategy may have been different from the strategy of to-day, but then the conditions under which it existed were different. The art of fortification had made considerable progress and it was used strategically. To fortify a capital city and make it secure against a besieger was just as much strategy in those days as the establishment of a safe base and depots of supply is strategy to-day. The two operations are of exactly the same nature. Then the laying waste of their own country in front of an invader, as practised by the Scythians, was just as good strategy as the similar performance by the Russians during the Moscow campaign. And just as effective. Indeed the author seems to think so himself in spite of his assertions to the contrary, for he says on page 53, in speaking of the Scythians: "Perhaps no savage nation

ever exhibited sounder natural strategy." And we maintain all good strategy is natural. When a whist player resorts to finesse, he must do it in a natural manner or his stratagem will fail. If there is anything in his manner to arouse the suspicions of his adversary, he is a bungler and not a strategist. We do not agree with the author in the definition which he quotes and adopts, that strategy is "The art of making war upon the map." Strategy is the art of deceiving your enemy. The thimble-rigger is a strategist. His tools are three thimbles and a pea. He covers the pea with one of the thimbles in the presence of his adversaries, and then moves them about in a seemingly careless way, accidentally tipping one of them and unconsciously discovering the pea to the audience just as he makes his bet that they cannot tell him where the "*little joker*" is. They think they know where it is. They bet; they call, and they lose. The pea is not there. What they thought a blunder in manipulation was a piece of consummate strategy. And it is just so in war. The difference is only in degree. The player manipulates army corps and bets a kingdom, but he gives his adversary the necessary glimpse to make him bite, and, if he is a good player, carries off the stakes.

Strategy is the mental game between the commanders, and precedes the physical game between the armies, which is tactical. The strategical game may be prepared—studied out—on the map, but it is played in the theatre of operations. Indeed, some strategical games are played entirely on the battle-field. Marathon is an example of this kind of strategy. It gives us a perfect picture of a brilliant tactical *coup* which was closely allied to strategy. The Battle of Marathon is sketched in Chapter VII.

Perhaps no commander ever entered upon what is known as a pitched battle without some definite idea as to his plan, and that idea may be read in the disposition which he makes of his troops. In other words the array contains the plan of battle. When the array exhibits a plane of weakness, so conspicuous that the enemy cannot help but see it, and disaster occurs at that very point, but is instantly checked and effectively countered by troops held in readiness for just such an occurrence, it is fair to assume that the apparent disaster was part of the general's plan. And that would be a sample of the strategy of the battle-field. There is a heap to be learned from the tactics of Marathon.

Strategy is a very difficult game, and it is doubtful if a man, without the natural talent for it, can ever learn it. A strategist is a reader of men rather than a reader of books. He must know his adversary better than he knows himself. He must know his weak points and his strong points. He must know exactly what it takes to establish a fact in the mind of his adversary, and how firm a hold the fact will have when it is established. He must know how his adversary will reason from established facts, and what action will most likely result from his reasoning. Then he must be able to manufacture the facts, sham ones of course, and contrive to bring them to his adversary's attention in the most natural manner. It is the finest kind of *finesse*, and no one but a master can play it successfully.

The retreat of the 10,000, or rather the functions of a rear guard as illustrated by Xenophon on that memorable march—sketched by our author in Chapter IX.—is a story which one would like to hear more of; and the expedition of Agesilaus into Asia, which seems to have pointed the way to Alexander, bristles with military lessons, just as important now as they were then. Agesilaus was an adept in the art of deceit, and deceit is an element in the Art of War. An adversary must be deceived, if possible, as to your movements and intentions. This is becoming difficult to do. Newspaper reporters and electric telegraphs make it almost impossible. There seems to be no clear way out of the difficulty but a return to the methods of Agesilaus. Lying has become a military necessity,

In the game of war between Alexander and Porus, sketched in Chapter XI., we have an illustration of the military importance of lying in order to deceive an adversary. A commander is not expected to advertise his intentions to his adversary. On the contrary it is his duty to deceive him to the utmost of his ability. If the saying or doing of things that are untrue, can give him an advantage over his adversary, how far is he justified in going?

Alexander purposely spread a false report that "he was afraid to cross the Hydaspes," knowing that it would come to his adversary's ears in a natural way, and that he would believe it. That was an essential point in his strategy. Napoleon deceived Milas in the same way during the campaign which ended at Marengo, when he contrived the bogus news that Moncey's corps had arrived on the Ticino. Lord Wolseley, too, if newspaper men are to be believed, let some of them hear him distinctly say, that his forces should not enter the Suez Canal. But why multiply examples? History is full of them. And perhaps the time has come when commanders of armies will be obliged to utilize the enterprise of the newspaper press in the way which will be of the greatest benefit to the cause they fight for.

As we come nearer Alexander's time the features of battle assume a more familiar aspect. Epaminondas practised the oblique order as neatly and effectively as ever Frederick did. No doubt Frederick's idea was copied from Epaminondas. Whether Epaminondas was a copyist or not, cannot, in the absence of historical data, be authoritatively determined; but it is more than likely that he was.

There is a striking similarity between the earlier years of Alexander and Frederick. Both were young when they ascended the throne. Both had been under a cloud. Both inherited excellent standing armies. The standing army of Macedon made Macedon master of Greece. Greece boasted of her freedom, valor, patriotism, declared she needed no standing army. Feared a standing army might endanger her liberties. And the result was she became the vassal of Macedon. The standing army which Alexander inherited made him master of the situation from the first. It was no sham army. The feats which it performed under the guidance of its young commander make one desirous of knowing something about it: what it was like: how it was organized and commanded.

After reading Chapter XII. one ought to know all about it, but the nomenclature is difficult to remember. However, one gets a clear enough idea of its tactical units, and their combinations and formations for battle or the march, as also of its weapons and armor. The nomenclature is of no importance to the picture. One also gets the idea that its drill was perfect and its manœuvres simple and few. Its officers were carefully selected. Promotion by merit was the rule and favoritism was carefully excluded.

"The Companions," so-called, both of the infantry and cavalry, were organizations composed of young men from the noblest families of Macedon, and allied tribes. Many of them were of royal blood. They were first established by Philip as a *corps d'élite*, and carefully trained and educated as future commanders of his troops. The Companion cavalry and infantry accompanied Alexander wherever he went. They were nobles by birth and fit companions for the king, although they acted as his guards.

Such a military school, the pupils of which were constantly under the eye of the king, in the battle and at the banquet, was the nursery from which superior commanders were drawn. They were selected by the king for assignment as suitable vacancies arose. Officers of inferior grades were selected in a peculiar manner. It was impossible for the king to know all his men as he knew the Companions. Consequently the king could not make selections for officers of the lower grades, either

for appointment or promotion. Still promotion for merit was the rule and some one must decide. To meet this difficulty judges were appointed—men in whom the whole army had perfect confidence—whose duty it was to hear and determine the claims of every aspirant for promotion, and report the most deserving to the king, together with their reasons for the selection. Alexander's soldiers were always well commanded and well led, and his rules of appointment and promotion explain the reason why.

There is nothing impresses the reader of these pages more forcibly than the fact that the military skill of those days was fully equal, and perhaps superior to the military skill of to-day. What has improved is the material. This is especially noticeable in siege operations. Deprive us of the use of gunpowder and other explosives, take away steam and electricity, and it is extremely doubtful if we could accomplish such an undertaking as the siege of Platæa in the same length of time as the Greeks did. The account of this siege may be found in Chapter XIII. It is exceedingly interesting and contains the germs of many modern inventions.

But we stumble now and again upon statements so startling as to need explanation. For instance, on page 185, in a description of how a road was cut along the slopes of Mount Ossa for the invasion of Thessaly, we read that it was accomplished by "Blasting a foothold for his army where it could not otherwise make its way." It would be interesting to know what explosive was used.

Nothing better illustrates the military ability and statesmanship of Alexander than his careful and thorough preparation of home affairs before his departure for Asia. By celerity and boldness, tempered by that suavity of manner for which he was celebrated, he conciliated Greece and then turned on the barbarians. The Illyrians and Balkan tribes, having heard of Philip's death, rose in revolt against the young king, and even the tribes beyond the Danube assumed a threatening attitude. Alexander laid aside the velvet glove in dealing with them. Power was the only argument they understood, and severity was the only evidence of power they would recognize. Alexander convinced them in very short order that, although Philip was dead, there still was a king in Macedon.

There was one incident in these campaigns which we cannot pass without notice, because it is the brightest bit of battle-field strategy which we have thus far encountered in Alexander's career. Pelium was a frontier post commanding the mountain pass which led into Illyria. The rebellious Illyrians had possession, and Alexander marched against the place to eject them. He was permitted to approach, unmolested, through a narrow and easily defended gorge, and went into camp before Pelium on a piece of level ground of no great extent, which seems to have been only a wider part of the pass. Behind him was the gorge through which supplies had to be brought, and before him was Pelium. In every other direction he was hemmed in by rugged, impassable mountains.

When Alexander had established his camp and was about ready to begin the reduction of the stronghold, he observed that the heights which commanded the gorge in his rear were occupied by the enemy, and that his communications were cut. He also observed that the mountains all round him were occupied in force, and that instead of being the besieger, he was really the besieged.

Alexander recognized the gravity of the situation. He could fight the barbarians if he could get at them, but for the time being they were beyond his reach. If they had sense enough to play a waiting game, the Macedonian situation would soon become desperate. Alexander determined to draw them from their vantage ground, and for this purpose he paraded his army in battle array and began an elaborate drill on the plain before Pelium. The spectacle must have been grand, as it was unusual.

The barbarians had never seen anything like it before. They were charmed with it, and descended to the plain to get a better view of it. They had taken the bait. In an instant that army dashed upon them like a shaft from a catapult, and in a few moments all the barbarians that were not dead were scattered to the winds. The gorge was garrisoned, and in due time Pelium was reduced.

There is nothing enhances the efficiency of an army more than mobility. This is well-illustrated by the destruction of Thebes, which was a part of Alexander's preparation for the Persian campaign. The cities of Greece were not friendly to Alexander. They had submitted only because they were afraid to fight, and now that Alexander and his army were 300 miles away, and having enough to do among the barbarians, they began to breathe again. At last a rumor came that Alexander was dead—killed before Pelium—and there was rejoicing in Thebes. The Thebans protested that they had never been afraid of Alexander and that their hearts' desire had always been to fight the Macedonians. While this frenzy was at its height Alexander and his army appeared, and summoned the city to surrender. But the Thebans were in no mood to surrender. They were too proud to eat their boasting words, so they defied the king, and were promptly swept out of existence. It was necessary for Alexander to show the cities of Greece a sample of his severity. Some sacrifice must be made. Thebes offered herself as a victim and was sacrificed. Alexander's departure for Asia then became possible.

The prize for which Alexander and Darius were about to contend was the sovereignty of Asia. Alexander depended for success upon the perfect training and efficiency of his little army of regular troops. Darius depended upon numbers. He swayed the sceptre over a vast empire, commanded untold wealth, and could meet an invader anywhere, with overwhelming numbers. The result must have been an astonishment to Darius. There is a lesson in that part of the story which might find an application not far from home.

We cannot dwell upon the battle of the Granicus. Alexander's army did not disappoint him. The fighting was magnificent, and deserved to win. But Alexander's tactics look like the essence of recklessness, and it is difficult to decide whether the victory was due to the idiotic arrangements of the Persians or the valor of the Macedonian troops. But if Memnon and his mercenaries had held the bank, Alexander, perhaps, would have tried other tactics. As it was, Persian jealousy had posted him in the rear, and Alexander's tactics became practicable.

We had marked for comment many passages in relation to the treatment which surrendered cities received at the hands of Alexander, but we have already exceeded the limits of a book review, and must pass them by. But no one can read that part of the history without being struck with the intellectual grasp and mental balance of the young king. Yet every now and then something turns up to unsettle our opinions and set us wondering once more what kind of a man Alexander really was. For instance, he declined to attack the Persian fleet, for excellent reasons, which he states with such clearness and force, in a conversation with Parmenio, that we are lost in admiration at the depth of his wisdom, when suddenly the conversation turns upon the significance of an eagle perching on the rocks near by, and the embodiment of wisdom which he had set up is suddenly enveloped in the mantle of superstition. His army believed him to be the son of Jupiter. Did he believe it? In spite of the fact that he encouraged such a belief in many ways, our author maintains that he did not believe it, and only encouraged the belief in others, from policy. And we agree with him. It is to be observed that the augurs and oracles religiously consulted by Alexander according to the customs of the Greeks invariably delivered themselves according to his wishes, and our author thinks that Alexander himself dictated the replies. It certainly looks

like it. But then is it not strange that a king with the mental powers and manly courage, and physical endurance of Alexander, should be unable to control his men, except by shamming superstitious belief in bogus oracles?

If anything were needed to demonstrate Alexander's military genius, his winter campaign along the coast, after the capture of Halicarnassus, would supply the need. The road to the heart of Persia was apparently open, and few conquerors could have resisted the temptation to take it. But Alexander was too wise to be led astray. The Persian fleet must be checkmated first. While it remained intact, Greece was liable to invasion, and there were elements in Greece which could not be relied upon in such a contingency. The situation was serious, but Alexander's good luck, and good judgment—it is difficult to say which was the more effective—rescued him from his embarrassment. Memnon, the able commander of the Persian fleet died, and the battle of Issus was won.

After reading the story of Issus one feels at a loss whether to praise the tactical skill and personal courage of Alexander, or censure the negligence which made such a battle necessary. In that battle—which could have been avoided—the Macedonians fought at a great disadvantage against heavy odds, and the effect of defeat would have been destruction. Now, the odds had to be encountered sooner or later, but the disadvantage and danger were clearly preventable. It is uphill work to argue against success, but it would be injustice to the military student to overlook negligence.

Space will not permit us to follow Alexander in his wonderful campaigns. Wherever he went success accompanied him. Sometimes the principles of the Art of War were observed and sometimes they were disregarded. But the results were always the same. Alexander's presence guaranteed success. No wonder that in that superstitious age he was accounted more than human. He could play the most dangerous game in the most reckless manner and always win. In forcing the Persian gates he risked everything. As the story is told in Chapter XXIX., he divided his force in the face of a superior enemy, and, relying on the word of a local shepherd, who might have been an enemy and could hardly have been a friend, he went off with over half his force over the snow-clad mountains, by paths which goats could barely climb, and which seem to have been unknown even to the natives, and after two nights of wandering, turned up at the right moment in the right place, and the Persian Gates were won. We cannot help thinking that if every incident had been faithfully recorded the feat of forcing the Persian Gates would appear as a more skillful and less wonderful story.

Another example of reckless daring which it would be unwise to imitate occurred in the pursuit of Darius. Alexander had pressed the pursuit with such energy that when he caught up with the army of Bessus he had only sixty companions at his back. The army was far in rear. But there was no hesitation. Alexander charged at once, sixty men against many thousand, and was successful. Perhaps the murder of Darius, which had just been accomplished to prevent his falling into Alexander's hands, had unnerved the enemy. Perhaps they were already demoralized and ready to be beaten. But Alexander knew nothing about it. He risked everything, and with his usual luck won the capital prize. But the incident can hardly be cited as an example of high military art.

But it is time to close the criticism, and in conclusion we would say: That while the book is interesting on every page, and as accurate as to facts as are the fountains from which they are taken, it is not a safe book to put in the hands of a military student. Alexander was a genius, and there is always a strain of insanity in men of that sort. Their methods are often eccentric, and the student is apt to attribute to the methods what really was due to the man, and thus be led into professional heresy.

A genius needs no rules of action. It is different with an ordinary man. If he would be successful he must be guided by the rules. If he attempts to copy the methods of a genius he must be prepared for the experience of Marshal Soubise. War is a spiritual as well as a physical game. It was the spirit of Alexander that carried his army through all its difficulties. Any other man, without such a spirit, attempting similar feats, although he copied Alexander's methods exactly, would certainly fail, and perhaps be laughed at. Success saved Alexander from ridicule, and he was accounted more than mortal by his followers, which was only another way of saying that no mere man, with only reason to guide him, would ever attempt such reckless undertakings.

So, in studying Alexander, or any other era-making master, hero worship should be guarded against. The problems which he encountered should be clearly stated. Then the solution, divested of all unnecessary details, should be given. A discussion of the principles involved might then follow, and finally the problem and its solution should be classified as an illustration in the application of the proper rule or maxim of the Art of War.

In spite of science, war is and always will be more or less a game of what we call chance, and in games of chance the reckless player is the poorest model for a novice. Of course the campaigns and battles of the great masters should be studied, but they should be studied as illustrations of the fundamental principles involved, and not as models to be blindly followed. C.

Forty Years a File-closer.*

A file-closer is subject to certain local restrictions that interfere somewhat with Dr. Johnson's request to

> "Let observation with extended view
> Survey mankind from China to Peru."

This would be too much to expect from a person whose eyes are usually confined to the coat-collar of the man in front of him or at best to his back hair.

And any individuality that might diversify this latter appendage is ruthlessly sacrificed to the shears of the company barber.

To tower over these obstacles then and present to us continental landscape in the artistic manner of our author is a triumph of no small proportions, and if there is a tendency to warm up with a bit of color the cold light of truth we pardon the effort in a work devoted to the dry details of exploration and discovery.

The name of Captain Wonbar does not appear in the Army Register. And since he was forty years a file-closer it is quite probable

> "He sleeps his last sleep, he has fought his last battle,
> No sound shall awake him to glory again."

And we have the *search for Stanton* as the crowning achievement of his *état de service*.

There is an apparent exaggeration about many statements in this memorial only to be satisfactorily explained by personal experience in the marvellous sights and sounds of a life on the Plains.

It is a country of buried ships and cities, of legendary treasure and heroes to which Captain Wonbar is the guide and of which Joaquin Miller is the poet, and the weirdness of the locality goes far to explain what would otherwise be considered the improbabilities of the tale.

The dead are, of course, entitled to nothing but praise, nevertheless it is to be re-

* *Forty Years a File-closer.* By Captain —— Bar. Washington: Chapman & Taylor, 1889.

gretted that the Captain should not have refrained from inaccuracy of expression like the following: "Then came the principal body of troopers, then the Signal Sergeant, then the train camels, and lastly the guard, *all* mounted on camels," which to say the least is a little redundant, and if true implies a reprehensible waste of transportation to which the attention of the Quartermaster General is invited.

Furthermore, there is a sort of defiant attitude in the text towards received conventionalities in phraseology and definition which is very perplexing, as for instance, when the "Great Shell River" is described as "flowing diagonally down stream." Properly, this characteristic belongs only to the Brandywine and other creeks of that ilk.

Neither is the Great Shell River down on the maps, and it would have been better if diagrams and an atlas had been prepared to illustrate the course and countries of this expedition.

Captain Wonbar adopted a precaution to which was doubtless due the remarkable directness of his journey, although at the sacrifice, perhaps, of such episodes of travel and adventure as might have been incurred in a more circuitous career.

This was to lash the compass needle so that it would not wobble. Few of us have failed to notice this defect, and the most generously supplied scientific outfits have been led to ruin thereby. Particularly where any doubt prevails as to the north end of this instrument, the simple expedient of the Captain will be found very useful, and would absolutely prevent a search for the venerable seat of the Aztecs bringing up at the grave of Sir John Franklin.

Often upon long marches a wise general smothers any indication of weariness and impatience on the part of the men by starting a tune like Dan Tucker or John Brown and always with the happiest results.

This consideration for the legs of his escort was touchingly manifested by Captain Wonbar who kindly contributed both metre and material. It is a delicate subject, but being ourselves rather fastidious where poetry is concerned we venture to submit that the moral and educational effect would have been heightened by a judicious selection from Hiawatha or Walt Whitman instead of the constant refrain,

> "Close to a dog-town, high and dry,
> Upon a bed of limestone, sand and clay"—

which may be true, but gets to be wearisome and seems to lack the harmony and imagination that cheer without inebriety.

The city of Stanton was at last discovered and we regret to find that people there were so like our own and were wont to confer brigadier-generals' commissions upon drivers of ice wagons, &c. Probably this is a custom of the late Civil War which still lingers on these remote shores.

For a detail of the disclosures in this obsolete metropolis we must refer the reader to the book.

But it is to be hoped that some of the regulations once in vogue among the Stanton veterans may be incorporated in the new edition of our own, especially that which requires every enlisted man who deserts to file before leaving a paper with his captain showing the causes which induced it.

This would certainly save our officers from a great deal of unremunerative labor in their investigation of things which no fellow has yet found out.

We believe that most men desert because they have nothing else to do, and that two dress parades and four drills daily with signal practice in the intervals and a little analytical geometry for the long winter nights would soon stop the business.

There is no question either but that as at Stanton napkins should be furnished the

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soldier if for no other reason than to keep him from using his pillow-sack for that purpose, and it is understood that the neglect to do so heretofore will be one of the reasons for the amnesty proclamation about to be issued for the benefit of those injured gentlemen to whom we beg permission to refer as disappointed military absentees.

The narrative under notice closes somewhat abruptly, which confirms our initial suspicion that its author, the Captain, is now in a world where bars are even more difficult to find than here.

Doubtless the transfer happened before he had revised his work. He has escaped the brain worry and gastric impatience that are the appointed lot of file-closers in all sublunary lands.

But fortunately his book remains. The few levities of manner to which we have alluded will disappear from future editions and we shall then have something amply qualified to take its place beside the other annals of our great discoverers from the Patent Office up to Powell, both inclusive. Why for our permanent consolation an inert Government does not order the immediate purchase and distribution of a thousand copies, together with Ingalls' Internal Ballistics, to each officer in service, will always remain a mystery, and in view of that fact the best thing we can do is to let individual enterprise make up the deficiency and so bring the hot blush of shame to the collective official cheek. H. W. C.

Heroic Deeds.

In the interest of post schools for children and illiterate men, I beg to call attention, through your book notices, to two small books which I have recently seen—"Stories of Heroic Deeds," and "Stories of Our Country," published by D. Appleton & Co., 1 Bond Street, New York.

They supply a want which all who have had to do with post schools must have felt, for books that could be used for tolerably easy lessons in reading, and yet not so dull or childish as to disgust older children or men. Both are admirable. The latter especially suited for post schools. It contains thirty-six short stories of events, from the landing of Ponce de Leon to the Battle of Buena Vista, and cannot fail, I think, to interest its readers; to encourage a taste for historical reading, and, above all, to aid in forming an intelligent love of country, which ought to be one of the chief objects of our post schools.

The books are beautifully printed, not too profusely illustrated, and marvellously cheap. H.

Guard Duty.

The manual of guard duty prepared by Lieut. L. W. V. Kennon, 6th Infantry, and of which the last edition has been published by authority of the War Department, is too well known to require description.

It seems almost a pity that the old question of stable guard for mounted troops could not have been settled somewhat differently from what is indicated in the foot-note to page 4, but the author, of course, presents rules as he finds them.

Lieutenant Kennon deserves commendation for the excellent manner in which he has performed the work, and we congratulate him on having obtained the "meed of official sanction."

HANCOCK.

The Sun of Tropic's fiery day
Appals but charms us not —
Give me the orb of genial ray
That shines without a spot.
Let heartless Power with splendor glow —
Give me the stainless Great,
Whom high and low and friend and foe
With awe appreciate. —
O! Great & Good! Oh! Brave & Kind,
Too brief has been the span
That makes each friend thou leav'st behind
Feel proud that he is MAN.

R. M. P.

NOTE.—The above tribute to the memory of the first President of the Military Service Institution is from the pen of the late Capt. R. M. POTTER (see next page).

Reuben Marmaduke Potter

Was born at Woodbridge, Middlesex County, New Jersey, February, 14, 1802. He died at his residence, 282 Franklin Avenue, Brooklyn, New York, March 18, 1890.

Captain Potter was appointed military storekeeper in the Quartermaster's Department March 23, 1848, and was placed on the Retired List of the Army, June 30, 1882. His military career was honorable and useful. A part of his early life was passed in Texas during the wild days, and he was a leading authority upon the written and unwritten history of that region. Small in stature, kind in disposition, gentle in manner, sober, just, firm, and brave, he went safely through times when the arguments used by frontiersmen to settle differences in taste and opinion were Bowie knives and Derringer pistols, and when death was sometimes the penalty for declining a Texan stranger's invitation to take a drink.

Captain Potter was a man of great learning, fine literary ability, clear and positive convictions, marked purity of character and unswerving fidelity to duty. The physical changes of lengthening years never disturbed the soundness or the satisfaction of his intellectual pursuits. He was always employed, and was always happy. Diligent in

improving his understanding, he was faithful in living up to his highest lights. In a letter to me dated June 19, 1886, he said: "I put up my headstone yesterday, and made my will some time ago." On the 5th of February, 1887, he wrote in response to my inquiry as to how he was wintering: "I am wintering well, and my health is good. I have the legitimate infirmities of age without the trimmings. No aches and pains, or lack of sleep, appetite or digestion, and no abnormal fear of death, though it ought to be looked for in nine days, for I shall then commence my eighty-sixth year."

Captain Potter bequeaths his manuscripts and all rights in his published works to General JAMES B. FRY, Vice-President of the Military Service Institution of the U. S., in trust for the Institution:

In his will, he says:

"I give back my soul to the mysterious source of life and mind from which it came, and my body to the elements from which it is derived. I die in the faith of The Unknown God, of whom Saul of Tarsus knew as little as I know, but I believe the Creative Power I refer to, whether, properly speaking, an element with personal attributes or a personality with elementary qualities, is the Great Mind from which Earthly Mind emanates, and the source of the Law of Nature and of Development, and, whether Individual or not, is the Head Spring of the Vast Flood of individuality which flows through Creation. I die in the belief of that unknowable but credible future state for at least the highest order of Individual Human Mind, which the inspiration of Human Instinct commends to our breast, for that instinct denies that the Creator would ever have doomed His mightiest work to early extinction. Father of Spirits! leave not our souls in the dust!

"In what I have before set forth I willingly follow a venerable and, on the whole, a commendable custom, that of prefacing a will with a confession of faith, for, though it often seemed to give an adhesion to superstitious error, it fulfilled a natural desire of the testator to declare and justify by example what he believed to be truth."

In a codicil he provides that the names of all the deceased members of his family shall be placed on one side of his tombstone, and that the following shall be inscribed upon the other side:

"Heed thou who yet livest,
Give thy body to the living and leave the dead
in devout trust
to the unknown God,
Till thou, too, shalt hopefully
fold thy hands
with the silent multitude." J. B. F.

OUR EXCHANGES.

ARTICLES OF MORE OR LESS MILITARY INTEREST.

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